Chemical Age

Britain's Record Chemical Exports

(pages 205, 210)

VOL. 85 No 2169

4 February 1961

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

CHEAPER TECHNICAL GRADE CHLOROFORM

I.C.I. has made substantial price reductions for technical grade chloroform

A SOLVENT FOR:

- —extraction of penicillin and other pharmaceutical products
- —oils, fats, resins, lacquers
- —cellulose acetate, polyvinyl acetate, benzoyl cellulose, cellulose acetate-butyrate, and polystyrene
- —bonding of plastics
- —manufacture of dyestuffs intermediates and fine chemicals

TYPICAL CHARACTERISTICS

Non-inflammable		
Clear and colourless		
Free halogens		not detected
Specific gravity at 15.5/15.5°C		1.502
Distillation range (5—95%)		0.3°C
Residue on evaporation at 110°C	%	<0.001
Moisture H_2O	%	0.023
Acidity as HCl	%	0.0001

DELIVERY IN BULK AND IN DRUMS

For further information, please consult—

IMPERIAL CHEMICAL INDUSTRIES LIMITED
LONDON S.W.1

ICI
GENERAL CHEMICALS DIVISION

GC.131

INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

(Continued on page 203)

INDEX TO ADVERTISERS

The first figures refer to advertisements in **Chemical Age Directory & Who's Who,** *the second to the current issue*

VOL. 85 No. 2169
FEBRUARY 4 1961

Telephone: FLEet Street 3212 (26 lines)
Telegrams: Benformula - Cent - London

Editor M. C. HYDE
Manager R. C. BENNETT
Director N. B. LIVINGSTONE WALLACE

Midland Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5]

Leeds Office
Permanent House, The Headrow, Leeds 1. [*Leeds* 22601]

Scottish Office
116 Hope Street, Glasgow C2. [*Central* 3954-5]

IN THIS ISSUE

Annual subscription is: home, 52s 6d, overseas, 60s, single copies 1s 6d (by post 1s 9d)

CHEMICAL AGE

BOUVERIE HOUSE · 154 FLEET STREET · LONDON · EC4

RECORD EXPORT TRADE

DESPITE the prolonged strike of tally clerks, 1960 was another record year for exports of chemicals. The total for the year, £316,648,592, was 8.7% up on 1959, itself a record year. (The CHEMICAL AGE survey of sales trends—14 January, p. 81, gave an estimated rise in 1960 exports of 9%.)

Imports of chemicals, too, were much higher than in 1959 and increased at a faster rate than did exports. Valued at £175,640,070, imports rose by 27.1% in 1960, compared with a rise of 15.2% in 1959.

An encouraging sign was the fact that while imports of chemicals from the European Economic Community rose by 21.6% (compared with a rise of 17.0% in 1959), exports to E.E.C. showed a much bigger increase in growth rate, one of 20.4% (compared with an increase of only 9.0% in 1959). British shipments to West Germany were higher by 18.9% (1959 showed a rise of 4.7%), while West German exports to the U.K. were up 18.8% (12.2% in 1959). Steepest rise in U.K. exports to the E.E.C. was in our trade with the Netherlands, up 32.7%.

As was expected when the European Free Trade Association (E.F.T.A.) was established, our exports to the other countries of the 'Seven' have been expanding at a slower rate than our imports from the area. U.K. exports were up 14.6% in 1960 (the 1959 rise was 15.9%), while imports from E.F.T.A. rose by 21.7% in 1960 (18.2% in 1959).

CHEMICAL EXPORTS AND IMPORTS

	Exports			Imports		
	1959	1960	Per cent + or − in 1960	1959	1960	Per cent + or − in 1960
	£million			£million		
World total	293.1	316.6	+ 8.7	138.2	175.6	+27.1
E.E.C. total	46.0	55.4	+20.4	56.3	67.5	+21.6
Belgium	6.8	7.5		5.6	4.6	
France	6.9	8.6		12.6	14.8	
Germany, W.	11.1	13.2		23.9	28.4	
Italy	9.3	10.3		4.0	6.4	
Netherlands	11.9	15.8		10.2	13.3	
E.F.T.A. total	27.4	31.3	+14.6	15.6	18.0	+21.7
Austria	0.5	1.4		—	—	
Denmark	5.6	6.1		0.6	1.0	
Norway	5.2	5.5		4.0	4.0	
Portugal	2.9	3.3		1.6	2.1	
Sweden	9.5	10.8		3.1	3.7	
Switzerland	3.7	4.2		6.3	7.2	
Commonwealth total	128.0	134.3	+ 4.6	16.9	20.5	+21.4
U.S.	11.5	10.6	− 8.5	33.7	50.5	+49.8
U.S.S.R.	2.8	6.0	+114.5	0.5	0.8	+63.4

In its overall trade in chemicals with E.E.C. and E.F.T.A., this country had a favourable balance of £1.2 million in 1960. Total shipments to both areas were worth £86.7 million, an increase of 17.9%. Imports from the two areas were worth £85.5 million, an increase of 18.8%.

(*Continued on page 213*)

Take-over Bids in Chemicals and Plastics

Control of Howards Would Give Laporte's a Stake in Phthalic, Sorbitol, Aspirin

IF approved, by shareholders, the share and cash bid for Howards and Sons Ltd., Ilford, will give Laporte Industries Ltd. control of one of the most progressive independent U.K. chemical manufacturers. This £3.5 million offer,

P. D. O'Brien, chairman of Laporte Industries

reported briefly in CHEMICAL AGE last week, would take the Group into the production of phthalic anhydride, cyclic ketones, phthalate plasticisers, sorbitol and aspirin.

Howards and Sons Ltd. are a holding company with Howards of Ilford Ltd. as the main operating company and Howards and Sons (Canada) Ltd., who make esters and cyclic alcohols. There are no other subsidiaries, although Howards have connections with Bowmans Chemicals Ltd., Mr. J. A. E. Howard being chairman both of Howards and Sons and Bowmans.

Howards are in the throes of a large-scale expansion programme which covers second stage of expanding aspirin production (due for completion early-1961), expansion of sorbitol capacity by 1,500 tons/year (due for completion early-1961), and a new cyclic ketones plant of 2,000 tons/year capacity, which is designed to work improved processes for cyclohexanone and methylcyclohexanone. These are due for completion early this year and construction is proceeding to schedule.

A second phthalic anhydride plant is due for operation in the autumn; it will double capacity to 6,000 tons/year. New plant with 1,000 tons/year capacity is in hand to expand capacity of cyclohexanol and methylcyclohexanol phthalate ester plasticisers. This is due for completion early next year.

Acquisitions in recent years have brought Laporte Industries to the top ranks of the U.K. chemical industry. Major producers of hydrogen peroxide and titanium oxide, they also produce large quantities of sulphuric acid and hydrofluoric acid, and are the only U.K. manufacturers of sodium chlorite. Other interests cover fullers' earth (Fullers Earth Union Ltd.), fluorspar (Glebe Mines Ltd.), fluorine chemicals (James Wilkinson), catalysts (Peter Spence), etc.

Terms for the £475,000 ordinary capital of Howards are nine Laporte 10s ordinary plus 15s cash, for every two Howards £1 ordinary. Terms for the £450,000 5½% Howards preference are 105 Laporte 5½% £1 second preference for every 100 £1 shares. As stated last week, the directors of Howards are recommending acceptance and intend to accept in respect of their own holdings.

It is intended that the good-will of the business of Howards will be maintained in every respect; the interests of staff and employees will be fully safeguarded.

D.C.L. Bid to Extend Plastics Interests to Fabricating Field

THREE bids for control of plastics firms made financial news since the last week's issue of CHEMICAL AGE went to press. British Industrial Plastics Ltd. have recommended acceptance of the offer made by Turner and Newell Ltd. (C.A., 28 January, p. 174), while the Distillers Company Ltd. revealed an offer worth £12.7 million for the share capital of British Xylonite Ltd. Erinoid Ltd., subsidiary of O. and M. Kleemann, have sold their interest in Nelson's Acetate and Nelsons Lancaster Estate for £450,333 to James Nelson and Hercules Powder, who were Erinoid's partners in the two companies.

If the D.C.L. bid is successful, Distillers would add to the wide range of raw materials handled by their Plastics Division one of Britain's largest fabricating firms, with interests in semi-finished products, p.v.c. pipes, plastics machinery, etc.

Currently D.C.L. Plastics Division manufacture Rigidex polyethylene, p.v.c., polystyrene, and a wide range of resins and other products. The company has been closely connected with British Xylonite since 1939 when it acquired a 50% interest with the latter in B.X. Plastics, now the main subsidiary of British Xylonite. B.X. Plastics not only produce semi-finished products, being a good customer of D.C.L. plastics materials, but also have their own subsidiaries producing finished products. Included in the British Xylonite Group are Extrudex Ltd., makers of p.v.c. pipes, Bexford Ltd., who produce a wide range of plastics household wares, Halex Ltd., Cascelloid Ltd., Expanded Rubber, etc.

It is stressed that in the event of the bid being approved, British Xylonite would maintain their identity and there would be no material changes in operations or personnel. One of the expected benefits, however, would be economies by eliminating duplication of services, notably research. B.X. Plastics spending on research has totalled some £250,000 a year.

The D.C.L. terms are recommended by British Xylonite directors.

At the annual meeting of British Industrial Plastics Ltd., Mr. C. H. Glassey, chairman, intimated that shareholders had been advised to accept the Turner and Newall offer. In his view, the next big breakthrough in the plastics industry would come in the field of structural plastics, and in this connection Turner and Newall had the know-how covering inorganic fibres, and B.I.P. had the technical knowledge on synthetic resins and engineering techniques for structural plastics.

The proposed merger held the elements required to cope with such a breakthrough—a consortium of technical knowledge, world-wide contact with engineers, architects, etc., as well as big financial resources.

Building plastics are the key to the formation of a new company by Thermo Plastics Ltd. and Universal Asbestos Manufacturing Co. Ltd. (see below).

Erinoid have simultaneously entered into a long-term agreement with their former partners for their needs of cellulose acetate flake.

James Nelson state that the partnership between themselves, Erinoid and Hercules Powder, for the manufacture of acetate flake at Lancaster was dissolved on 31 December 1960. The partnership will be continued by James Nelson and Hercules Powder as equal partners.

Building Plastics are Key to New Joint Venture

THE great potentional for the development in the use of plastics in the building industry has led the Universal Asbestos Manufacturing Co. Ltd., and Thermo Plastics Ltd., a member of the Tootal Group, to launch a joint project to produce plastics materials for the building industry.

They have formed a new company, as equal partners, under the name of Allied Structural Plastics Ltd. Initial capital is £100,000 and directors are Mr. J. Morrish and Mr. F. R. B. Lockwood (Thermo Plastics) and Mr. D. Kirkness and Mr. P. Talbot-Smith (U.A.M.)

Project News

A.P.V. to Build Welsh Benzole Refinery for Bitmac

IN the face of severe competition from other U.K. and Continental suppliers, the Chemical Engineering Division of the **A.P.V. Company Ltd.**, Crawley, has received an order from **Bitmac Ltd.** for the design, supply, erection and commissioning of a complete new benzole refinery in South Wales. The new plant will process 8 million gall./year of crude coke-oven benzole. In addition to design and construction, A.P.V. will handle civil and electrical engineering.

The contract is valued at more than £300,000. A number of other smaller orders have recently been received for values of about £100,000 and A.P.V. now have a turnover of more than £1 million/year.

The refining process will be completely continuous and will incorporate the new A.P.V. continuous defronting and pulsed column acid washing units which permit the production of benzene containing as little as 5 p.p.m. of total sulphur. Bitmac will therefore be able to supply high-quality benzene to meet expected competition from petroleum aromatics.

In addition to high-purity benzene and toluene products, the plant will produce an indene-rich fraction and a 3° xylole fraction; motor benzole will not be produced. Extremely high yields are guaranteed, as is an overall steam consumption of about 9.5 lb./gall of crude benzole (including that for acid tar steaming).

This refinery will be installed at Llanwern on the Spencer Works site of Richard Thomas and Baldwins Ltd.'s new steel plant and will be the third large benzole refinery to be built by A.P.V. in the U.K. since 1958.

Construction Manager Named for Belfast C.C.F. Project

● MR. F. C. BRAMMER, Wilton construction projects engineer, has been seconded for 18 months from I.C.I. Billingham Division as construction manager in connection with the new concentrated complete fertiliser plant which **Richardson's Chemical Manure Ltd.** will build at Belfast. Main contractors for this plant are **Constructors John Brown Ltd.**

Laporte-Indian Joint Venture for Titanium Oxide

● IN conjunction with the Bombay Dyeing and Manufacturing Co., **Laporte Industries Ltd.** are planning to produce titanium oxide on a site that has been acquired near Bombay. A company has been jointly registered for this purpose, Laporte holding a minority interest.

Bombay Dyeing, through National Peroxide, produce, with Laporte know-how, hydrogen peroxide by the electrolytic route, as well as sodium perborate.

Currently Laporte Industries have in hand two other overseas titanium oxide plants. As stated in C.A., 17 December, they are to establish a £3.5 million plant at Bunbury, south of Perth for the production of 10,000 tons/year titanium oxide, which is expected on stream by 1964. Laporte Chemicals (Australia) of Sydney, are already producing hydrogen peroxide and peroxygen compounds at Botany, N.S.W. The only other TiO_2 producers in Australia are British Titan Products, who have a plant in Tasmania. In California, Laporte and American Potash and Chemical Corporation are jointly concerned in a new venture to produce 25,000 tons/year of titanium oxide. The plant is expected on stream late in 1962 (see C.A., 26 November).

I.C.I. Argentine Subsidiary to Make Terylene

● ARGENTINE subsidiary of I.C.I., **Industrias Quimicas Argentinas Duperial S.A.**, are to make Terylene at San Lorenzo. The Terylene plant, which involves an investment of £1.5 million, will have an initial capacity of 2 million lb./year. It will be built on the 80-acre site where the £5¼ million polythene plant and plants for the production of sulphuric acid, carbon disulphide, hydrogen peroxide and phathalic anhydride are at present under construction.

Financed by the parent company, the Terylene project will bring total I.C.I. investment at San Lorenzo over the next three years to nearly £10 million.

U.K. output of Terylene, initiated by I.C.I. on a commercial scale only six years ago, has more than quadrupled and I.C.I. licences for the manufacture of polyester fibre have been granted to companies in seven other countries.

Humglas to Exhibit Model of Leuna Ethylene Cracker

● ENGINEERING work for the ethylene cracking unit for the **Walter Ubricht** chemical works at Leuna, East Germany, will be substantially completed by March, according to a spokesman for **Humphreys and Glasgow Ltd.**, the London contracting firm who are undertaking this work. Total cost of the project will "run into millions."

Humphreys and Glasgow, who do 65% of their business with foreign countries, are to show a scale piping model of the ethylene cracker when they exhibit for the first time at this year's Leipzig Spring Fair (see below). It weighs about 3 cwt. and measures 12 ft. by 9 ft. with a maximum height of 2 ft., and is constructed on a scale of 1:30. The actual plant, used for breaking down liquids and gases by high temperatures, pressures will have an area of 360 ft. by 250 ft. and a height of 60 ft.

£4 M. Improvement Scheme for I.C.I. Pharmaceuticals

● A PHARMACEUTICAL factory which will eventually employ some 2,000 personnel is to be built at Macclesfield, Cheshire, as part of a £4 million scheme to improve and develop the research, production and distribution facilities of **I.C.I. Pharmaceuticals Division.** Negotiations for the purchase of a site for the factory, near the Division's Alderley Park research laboratories, are proceeding.

Finishing of I.C.I. pharmaceutical products is at present carried out at the company's Regent factory, Linlithgow, near Edinburgh, which will be closed in two or three years' time. Smaller units at Grangemouth, Stirlingshire, and Oldham, Lancs, will ultimately be transferred to Macclesfield.

Manufacture of pencillin will continue at Manchester, together with some production at Grangemouth, but it is believed that in the long term practically all the division will operate from Cheshire.

New Davy-Ashmore Firm for Overseas 'Turn-key' Projects

● DAVY-ASHMORE have formed a new subsidiary, **Davy-Ashmore Export Co. Ltd.**, to manage and develop the overseas selling and engineering organisation and to promote a further extension of the group's export trade in capital goods.

Directors are: Mr. M. A. Fiennes (chairman), Mr. D. L. Campbell (managing director), Mr. D. M. R. Brown, Mr. M. F. Dowding, Mr. T. K. Hargreaves, Mr. C. Robson, Mr. R. W. Rutherford, Mr. H. M. Sutherland and Mr. H. H. Utley. Mr. L. Davis is secretary.

It is expected that the new company will provide valuable assistance to overseas buyers in the handling of large 'turn-key' contracts, in the fields of iron and steel, chemical, petrochemical, gas and petroleum engineering, which cover the main activities of the Davy-Ashmore group.

U.K. Plant Firms at Leipzig Spring Fair

A variety of chemical plant, pumps, instruments, valves, powder metallurgy equipment, etc., will be exhibited by a number of British chemical plant manufacturers at the Leipzig Spring Fair, opening on 5 March. The will exhibit on a group stand organised by Humphreys and Glasgow, who themselves will be showing a model of an ethylene cracking unit as discussed on this page.

Other firms exhibiting on the group stand include: G. A. Harvey and Co. (London) Ltd., Langleys Alloys Ltd., Sharples Process Engineers Ltd., Oxley Engineering Co. Ltd., G. and J. Weir Ltd. representing a British pump manufacturer and probably also a British instrument manufacturer.

★ LIKE 1960, this year has started with a bang so far as take-over bids are concerned. Howards must be delighted with the terms offered by Laporte, but from the latter's point of view this would be an investment in a firm with first-class prospects and a fine record of progress. Laporte would be buying themselves into an interesting product range—cyclic ketones and plasticisers based on phthalic anhydride, 6,000 tons-a-year phthalic capacity by the autumn, plus expanding capacity for sorbitol and aspirin.

Of the other mergers, Distillers' bid for the British Xylonite Group is a 'natural' if only because D.C.L. already hold a 50% interest in the main subsidiary, B.X. Plastics. If this bid succeeds, all the main U.K. producers of plastics materials will have interests of one kind or another in the fabrication field, advantages of which are obvious.

The Turner and Newell bid for British Industrial Plastics and the formation of a joint company by Thermo Plastics, of the Tootal Group, and Universal Asbestos Manufacturing Co. are interesting for a different reason. Both moves have in mind the enormous potential market for structural plastics in the building industry.

★ LAPORTE are also in the headlines this week with the news of a new joint titanium oxide plant in Bombay—the third overseas TiO_2 venture to be announced in past few weeks (see also p. 207). Full details are not yet available, but it is clear that Mr. P. D. O'Brien, chairman of Laporte Industries Ltd., in his eight-week world tour completed just before Christmas must have had few spare moments.

He visited American Potash and Chemical, with whom one of the projects is connected, Western Australia where another titanium oxide plant has been announced, and the Bombay partners in the Indian venture. The Australian venture was under study for some time before a decision was made. The plant is to be erected in the west near ilmenite deposits, rather than in the east where main users are sited. Industrial development is so vital to Western Australia, that signing of the agreement with the local government was filmed for TV, while the project made front page news in the local Press.

Mr. O'Brien, who talked about his tour at an informal meeting of the trade and technical Press on Tuesday, was clearly impressed with the large-scale British investment in India. He clearly feels that there is a big future in this country for U.K. chemical manufacturers and that they are playing their full part in the industrial development of this country. (On p. 209, a Benn Group staff correspondent reports on the Royal Tour of India and the interest shown by the Queen in the development of India's chemical and mineral facilities.

★ A SIMPLE latent heat method seems to be the answer to the problems of transporting large quantities of natural gas by sea without losing too much of it by evaporation, according to Conch International Methane Ltd., of Nassau, Bahamas.

The difficulty of transporting liquid methane without continual refrigeration has always been that the slow inflow of heat through the insulating walls of the container is sufficient to raise the temperature of the liquid to its boiling point and evaporate considerable quantities. Not only is that a waste of gas but it is dangerous for the crew. The method recently patented by Conch consists of adding a small quantity of another liquefied gas such as nitrogen which has a boiling point much lower than methane. Any heat absorbed, therefore, merely evaporates the nitrogen present—which, being inert, constitutes no danger to the crew—and keeps the temperature of the gas at the boiling point of nitrogen. At this temperature there is a little evaporation of methane but only a small proportion of the amount that would be lost at the higher temperature.

The amount of nitrogen to be added would naturally depend upon the length of the voyage.

★ YOU are a scientist, youngish, but with a creditable record of original research behind you. You are handed a piece of coal, a bottle of crude oil, and, let's say, a cylinder of methane, and told: "Locked up in these materials are valuable fuels and hydrocarbons. Take them, collect a research team about you, and see what you can do to develop some ideas for extracting those fuels and hydrocarbons efficiently and economically, and for bestowing their benefits on industry and on the populace at large. Do not let yourself be influenced by any previous industrial developments connected with the processing of these minerals but bear in mind that your task is to serve the British gas industry, and to further its progress and prosperity."

I do not know if the scientist who takes on the leadership of the Gas Council's proposed new research group (see p. 214) will be given such broad terms of reference as this but certainly it looks as though he will be encouraged to think about gas manufacture and distribution along completely new lines. The broad-mindedness of the Gas Council on this question can be gauged from the fact that, in their advertisement inviting applications from suitable candidates, they do not even specify a chemist or a chemical engineer; it is only stipulated that candidates "who should have post-graduate qualifications, must be able to submit evidence of first-class ability in original research".

Certainly the Gas Council, who are already spending very large sums of money on research into new methods of coal and oil gasification, as well as gas purification and by-product treatment, appear to be leaving no stone unturned in their quest for a way out of the gas industry's present difficulties. This latest move towards a fresh, original approach shows that neither the Lurgi process nor the processing of imported methane is regarded as the ultimate answer.

★ FIRST edition of a new quarterly magazine called *Lederle Bulletin* has been launched by the Lederle Laboratory Division of Cyanamid of Great Britain. The *Lederle Bulletin*, a review of scientific, medical and recreational subjects published exclusively for the medical profession, will replace the greater part of the company's former mailed advertising to British doctors.

The idea of such a bulletin arose from many suggestions received by Cyanamid for a publication of this kind. In view of mounting criticism of the amount and cost of material mailed by pharmaceutical firms to doctors, it seems to me to be a step that other firms might well consider. Cyanamid hope that by providing a magazine of wide appeal they can present their company and its products in an interesting and informative way, and thus further reduce promotional mailings.

The first edition contains among other articles the story of the development of Ledermycin. This is a good illustration of the mixture of progress and setback, disappointment and reward which lies behind most developments of this type.

★ MORE than one of the major contracting companies that bid for the projected Esso butyl plant at Fawley is anxiously awaiting a decision. Appointment of a main contractor for their £4.3 million plant cannot be long delayed: since the original Esso announcement, Polymer Corporation of Sarnia, Ont., have stated their intention to build a butyl plant in the U.K.

Esso have said they will produce 30,000 tons-a-year of butyl; Polymer have given no capacity figure. Clearly at this stage there is not room for more than one butyl plant in the U.K., even then it must be doubtful if the market could absorb anything like the Esso capacity for some time to come. It may be that current U.S. over-capacity in synthetic rubber, including butyl, has influenced Esso's thinking. But there must be a danger that this delay could help get Polymer first off the mark if they are serious in their plans.

Alembic

Royal Tour of India

Queen Hears of Drive to Step up Output of Minerals, Fertilisers

From the Benn Group Staff Correspondent with the Royal Tour

IN discussions, during the Royal Tour by Queen Elizabeth and the Duke of Edinburgh, I was told of the intensive drive by India to step up her production of minerals and chemicals.

Side by side with this, under the country's third five-year plan, energetic steps will be taken to increase production of nitrogenous fertilisers, and to increase imports of potassium, of which she has few known reserves.

The pressing need for more fertilisers, so that food production can show a marked upward trend, was stressed again and again as the Royal Tour progressed through the rural areas.

Mr. H. O'Brien, of the British Trade Commission in New Delhi, gave me the picture regarding India's future programme for fertilisers.

Nitrogenous fertiliser production began substantially around 1950, when the Government of India plant at Sindra began to produce ammonium sulphate. Phosphates have been manufactured in India since before the war and the number of companies producing single superphosphate has continued to grow. However, at present no triple superphosphate is produced, and local production of potash fertilisers is negligible.

The Government's present aim is to develop, as rapidly as possible, within the limits of its capital resources and foreign exchange, the production of nitrogenous and phosphatic fertilisers. Because the country is low in potassium deposits, imports of potassium fertilisers will be increased in step, in order to avoid national risks of fertiliser imbalance.

Nitrogen Target

Under the third five-year plan India's target for the production of nitrogen fertilisers is likely to be 1 million tons annually. This will involve an increase of 400,000 tons over existing capacity.

The planning objective for phosphorus is 300,000 tons by the middle of 1963. This will be in the middle of the third five-year plan, when the situation will be reassessed and a new target fixed.

For potash the target is fixed at 200,000 tons and practically the whole of this will be met by imports.

Mr. N. N. Kashyap, secretary to the Ministry of Mines at New Delhi, in telling me of his country's efforts to find and work more mineral deposits, stressed that India was only at the start of her programme. More and more metallurgists and mining experts are being poured into the field, as fast as the universities can train them and they can gain practical experience. Already 450 trained workers are in active survey teams and three or four times as many more are urgently required.

The present annual expenditure on the location and proving of deposits is R. 65 million, and this will be increased to R. 150 million under the third five-year plan. The search for minerals is perpetual and the more the work is extended the greater are sizeable deposits traced. Vast areas of the country remain unsurveyed.

India now claims the best iron deposits in the world and she is already exporting 3 million tons of ore a year. At the moment lack of transport and port facilities are a brake on the export trade, but the government promises energetic steps to solve this problem.

By 1966 the aim is to expand exports of iron ore to 10 million tons annually from a total production which, it is estimated, will then be in the region of 32 million tons each year.

Parallel with this, bauxite deposits will be further developed. High-grade manganese deposits are also considered quite promising. More exploitation of manganese will go on, although Brazil and Africa will undoubtedly continue to provide heavy export competition. In this respect India is handicapped by long hauls from mining areas to the coast, which put up costs. On the other hand, with a vast population and a considerable unemployment problem, she is unlikely to encounter labour difficulties.

India is short of lead, copper, zinc and tin and, even if new deposits of worth are found fairly soon, home demands will almost certainly claim full production. It is hoped soon to go into new zinc deposits in Rajasthan.

Iron ore production in the first six months of 1960 was 5.36 million tons, compared with 3.83 million tons the previous year. Figures for the same period for other metals were: Chromate, 71,275 tons (54,247 tons 1959); manganese, 624,000 tons, 1960 (651,000 tons); bauxite, 188,000 tons (said to be nearly double the unstated figure for 1959); copper ore, 291,000 tons (200,000 tons); lead-zinc ores, 77,000 tons (79,000 tons); gypsum, 533,000 tons (428,000 tons).

Exports during the first six months of 1960 were: Aluminium ore, 30,736 tons (9,709 tons); iron ore, 1,922,000 tons (1,291,000 tons); manganese 586,125 tons (536,548 tons).

Evans Medical's New Virus Vaccine Division

A NEW virus vaccine division in now in operation at Evans Medical's headquarters at Speke, Liverpool. Smallpox vaccine has been produced for many years at the Evans Biological Institute, Runcorn, but the new division has been set up to deal with the increasing numbers of viruses from which vaccine has been prepared.

The division consists of a research and development unit and tissue culture and egg culture production buildings. These buildings form three sides of a quadrangle. The fourth side is occupied by the block housing the complex engineering services. Nearly three-quarters of the space in the buildings is air-conditioned to prevent the escape of infected air and the air in each building is filtered separately. The layout of the quadrangle provides a physical barrier against cross-contamination and each building is self-contained. To start with, products of established value both medical and veterinary (e.g. influenza vaccine and canine distemper vaccine) are being made. The research unit in the virus division will be able to undertake the development of new vaccines.

Oral Contraceptive Now Available in U.K.

ORAL contraceptive pills are available in the U.K. for the first time. The drug is called Conovid and is produced by G. D. Searle and Co. of High Wycombe. Conovid is "approximately half strength" Enovid (17-ethinyl-17-hydroxy-5(10)-estren-3-one), the drug which was given Food and Drug Association clearance in the U.S. last year (see CHEMICAL AGE, 21 May 1960). The drug costs 23s 6d for a month's supply.

Obituary

Mr. N. H. William, B.Sc., M.I.Chem.E., M.I.Gas E., a well known chemical engineer and a director of Humphreys and Glasgow Ltd., died recently after a long illness. He was director in charge of the company's research and development department and devoted his energies to the studies and plans towards the modernisation of gas production at high temperature and pressures. He was 56. He joined Humglas in 1936 after service with British Dyestuffs Corporation, Institution of Gas Engineers and Leeds University.

U.K. CHEMICAL EXPORTS AND IMPORTS

EXPORTS of chemicals from the U.K. in 1960 reached a total value of £316,648,592, setting a new record, £23.5 m. higher than the 1959 total of £293,096,461. However, this makes a percentage increase of only 8%, against the 12% increase of 1959 over 1958 exports. Imports, on the other hand, showed a 27% gain over the previous year's 15%. The favourable balance of £141 m. is 9% below the 1959 balance.

EXPORTS		QUANTITY		VALUE	
		1959	1960	1959	1960
INORGANIC				£	£
Acids	Cwt.	178,775	327,597	664,426	1,175,172
Copper sulphate	Tons	31,086	24,966	2,098,600	1,980,475
Sodium hydroxide	Cwt.	5,011,080	4,557,444	6,293,403	4,813,569
Sodium carbonate	,,	3,994,133	4,582,471	2,512,707	2,643,205
Aluminium oxides	Tons	33,424	26,349	1,205,932	1,002,258
Aluminium sulphate	,,	30,263	38,457	413,632	499,173
Other al. cpds.	,,	4,821	3,892	202,271	153,377
Ammonia	Cwt.	94,534	90,653	352,419	328,491
Ammonium cpds. (not fertilisers or bromide)	Tons	17,471	22,831	650,019	814,918
Arsenical compounds	,,	2,546	5,996	184,585	410,574
Bismuth compounds	Lb.	387,046	444,708	305,067	345,693
Chloride of lime	Cwt.	289,198	350,520	495,439	620,738
Hydrosulphite	,,	111,563	106,536	825,277	832,786
Other bleaching materials	,,	191,968	248,179	844,957	1,136,599
Calcium compounds	,,	407,738	420,164	824,685	826,921
Carbon blacks	,,	1,023,678	1,179,444	3,806,779	4,256,939
Cobalt compounds	,,	20,002	17,852	579,617	438,906
Iron oxides	,,	94,769	126,433	293,127	388,461
Lead compounds	,,	70,639	76,219	331,995	366,479
Magnesium cpds., n.e.s.	Tons	36,476	16,894	1,434,057	974,766
Nickel salts	Cwt.	96,164	103,820	875,569	969,354
Potassium cpds. (excl. fertilisers, bromides)	,,	73,569	86,252	651,076	708,387
Sodium bicarbonate	,,	773,751	860,220	700,834	802,357
Chromate, dichromate	,,	57,923	34,472	252,139	159,017
Phosphates	,,	278,795	322,336	1,076,291	1,199,384
Silicate (water glass)	,,	324,054	300,620	322,352	308,056
Other sodium cpds.	,,	1,631,672	1,885,477	3,767,134	3,661,608
Tin oxide	,,	9,166	7,837	331,554	299,903
Zinc oxide	Tons	11,094	7,919	816,559	645,723
Inorganic elements & cpds., n.e.s.	—	—	—	5,482,729	6,118,479
ORGANIC					
Acids, anhydrides, salts & esters	—	—	—	2,919,036	3,084,985
Glycerine	Cwt.	47,331	32,840	544,824	391,225
Ethyl alcohol, etc., & mixtures, n.e.s.	—	—	—	2,494,978	4,186,084
Acetone	Cwt.	135,004	144,709	391,971	390,913
Citric acid	,,	61,175	62,616	562,674	531,706
Gases, compressed, liq. or solid, n.e.s.	—	—	—	1,343,685	1,739,937
Phenol	Cwt.	200,556	304,754	1,180,468	1,920,279
Salicylates	Lb.	680,603	801,942	165,072	181,210
Sodium compounds	Cwt.	35,247	41,302	553,302	682,244
Sulphonamides not prepared	Lb.	1,487,949	1,609,844	856,592	913,551
Dye intermediate, n.e.s.	Cwt.	102,093	93,221	1,573,827	1,465,556
Organic cpds., n.e.s.	—	—	—	19,157,553	22,895,054
Coal tar	Tons	55,146	69,645	641,293	766,565
Cresylic acid	Gall.	3,011,764	3,414,525	1,007,674	1,238,794
Creosote oil	,,	26,699,190	18,708,998	1,630,744	1,233,185
Other mineral tar, etc.	—	—	—	627,923	704,970
Pigment dyestuffs	Cwt.	36,112	46,036	1,602,990	1,927,371
Other syn. org. dyestuffs	,,	196,306	237,226	10,107,285	11,837,339
Syn. org. pigments	,,	26,381	29,609	1,074,756	1,193,874
Dyeing extracts	,,	1,912	2,767	83,096	87,704
Tanning extracts	,,	102,905	103,313	411,044	411,067
Pigments, paints, putty, etc.	—	—	—	26,352,703	28,930,435
Drugs, medicines, etc.	—	—	—	40,917,956	44,355,333
Essential oils	Lb.	2,307,737	2,512,522	2,225,581	2,395,571
Explosives (excl. nitrocellulose)	—	—	—	10,056,384	9,551,637
Carbons	Cwt.	75,747	97,936	363,311	486,903
Tetraethyl lead	Gall.	6,233,015	6,542,959	12,710,114	12,739,021
AGRICULTURAL					
Ammonium nitrate	Tons	1,043	496	34,170	17,038
Ammonium sulphate	,,	213,968	177,777	3,109,464	2,446,956
Other fertilisers	—	—	—	264,375	287,493
Disinfectants, sheep & cattle dips, etc.	Cwt.	126,306	138,594	825,937	923,583
Weedkillers	,,	57,063	75,467	861,461	1,131,222
Other, incl. insecticides	,,	382,263	411,383	4,882,332	5,630,900
MISCELLANEOUS					
Plastics materials	Cwt.	3,146,697	3,423,466	39,979,084	42,897,215
Of which polystyrene	,,	253,601	226,347	2,678,071	2,360,239
Polythene	,,	32,342	36,817	635,348	729,749
P.v.c.	,,	627,466	719,429	7,193,839	8,160,919
Photographic chems.	,,	41,077	43,296	722,693	858,525
Gas & chem. machinery	,,	147,709	150,492	5,459,709	3,892,269

IMPORTS		QUANTITY		VALUE	
		1959	1960	1959	1960
INORGANIC				£	£
Boric acid	Cwt.	72,900	135,986	237,921	436,641
Arsenic trioxide	Tons	4,610	9,815	138,684	299,551
Al. oxide—					
Crude	,,	11,875	20,486	670,579	1,138,605
Ground	,,	2,351	4,039	214,764	388,749
Silicon carbide	,,	9,161	14,014	1,000,272	1,463,981
Borax	Cwt.	512,539	574,068	1,069,626	1,213,398
Calcium carbide	,,	1,582,458	2,286,070	2,769,664	3,912,165
Channel black	,,	155,743	149,277	957,914	1,016,148
Other carbon blacks	,,	150,884	187,883	693,997	833,043
Cobalt oxides	,,	11,340	16,158	504,101	677,054
Iodine	Lb.	1,130,621	1,347,746	369,890	446,629
Mercury	,,	1,955,995	1,919,403	1,850,039	1,726,933
Sodium, calcium, potassium, lithium	Cwt.	178	357	25,327	41,036
Potassium carbonate	,,	96,500	138,964	301,079	431,979
Selenium	Lb.	207,430	312,917	515,735	721,390
Silicon	Tons	7,427	8,272	1,040,558	1,324,292
Sodium chlorate	Cwt.	115,451	99,772	344,674	268,712
Titanium oxides	,,	35,228	17,048	166,550	151,321
Inorganic cpds., n.e.s.	—	—	—	6,663,125	8,599,780
ORGANIC					
Acids, anhydrides, salts and esters	—	—	—	2,630,367	6,012,357
Glycerine	Cwt.	190,791	136,944	1,555,580	1,050,169
Menthol	Lb.	200,099	179,892	370,825	402,112
Alcohols and mixtures	—	—	—	4,932,634	4,518,058
Spirits of turpentine	Gall.	756,454	784,049	182,720	178,803
Styrene (monomeric)	,,	2,442,012	2,878,294	1,001,123	1,158,817
Vinyl acetate (monomeric)	Tons	5,375	7,576	582,042	847,694
Organic cpds., n.e.s.	—	—	—	22,300,688	28,349,141
Syn. dyestuffs	Cwt.	40,344	50,427	4,016,861	4,714,308
Extracts—					
Dyeing	,,	12,456	13,423	103,771	104,232
Tanning	,,	632,914	516,830	1,971,738	1,470,677
Pigments, extenders	,,	123,674	175,421	280,202	341,948
Other pigments, paints, etc.	—	—	—	1,312,908	1,447,782
Antibiotics	—	—	—	707,669	1,535,100
Other drugs, etc.	—	—	—	3,730,127	3,753,824
Essential oils, etc.	Lb.	6,582,490	7,325,162	6,067,695	7,285,199
Perfumery, toilet goods	—	—	—	917,736	1,267,213
Plastics materials	Cwt.	1,090,849	1,866,425	19,809,585	29,731,694
Of which, p.v.c.	,,	339,550	713,541	3,966,743	6,519,702
Alkyd resins, etc.	,,	38,321	58,210	389,267	600,196
AGRICULTURAL					
Basic slag	Tons	105,808	80,459	824,685	645,436
Potassium chloride	Cwt.	12,224,324	14,266,445	9,860,236	10,554,018
Potassium sulphate	,,	500,739	458,640	438,339	378,810
All other	—	—	—	5,175,048	4,925,113
Phosphates of lime	Tons	1,055,690	1,431,187	6,446,274	8,358,295
Disinfectants, insecticides, etc.	Cwt.	58,786	42,671	1,210,390	1,373,478
MISCELLANEOUS					
Sulphur	Tons	377,445	487,076	4,026,126	5,083,136
Chromium ore	,,	165,092	296,469	1,803,146	3,431,711
Tantalum & niobium ores and concentrates	,,	532	806	338,350	505,530
Titanium ores	,,	251,343	351,251	2,207,020	2,912,347
Gas & chem. machinery	Cwt.	18,054	15,139	837,098	804,381

TRADE WITH PRINCIPAL MARKETS

COUNTRY	EXPORTS (Value, £'000) 1959	EXPORTS (Value, £'000) 1960	IMPORTS (Value, £'000) 1959	IMPORTS (Value, £'000) 1960
Ghana	6,209	6,095	—	—
Nigeria	7,017	8,211	—	—
South Africa	11,785	12,954	2,511	2,563
India	15,665	14,066	608	1,219
Pakistan	3,742	6,681	—	—
Singapore	3,673	3,837	582	465
Malaya	3,811	4,912	297	337
Ceylon	4,266	3,748	278	278
Hong Kong	5,809	5,571	155	102
Australia	24,059	24,794	449	657
New Zealand	7,234	8,293	1,020	1,207
Canada	9,604	9,421	8,914	11,277
Eire	8,464	8,945	450	697
Soviet Union	2,862	5,998	519	854
Finland	3,468	4,106	—	—
Sweden	9,491	10,831	3,105	3,678
Norway	5,199	5,547	4,036	4,003
Denmark	5,605	6,084	654	1,002
East Germany	—	—	2,233	3,014
West Germany	11,062	13,212	23,969	28,424
Netherlands	11,928	15,775	10,259	13,283
Belgium	6,829	7,508	5,628	4,598
France	6,972	8,611	12,603	14,845
Switzerland	3,753	4,256	6,292	7,256
Italy	9,354	10,276	3,993	6,398
China	3,536	2,648	930	623
Japan	3,074	3,407	1,257	1,289
United States	11,504	10,601	33,730	50,513
Venezuela	3,363	3,167	—	—
Brazil	2,047	3,136	549	607
Argentina	4,763	3,017	740	786
Total, all countries	**293,096**	**316,649**	**138,249**	**175,640**

'Guestimation'—by Contractus

Urgent Need for More Accurate Data in Chemical Plant Cost Estimating

RECENT formation of a Society for Cost Estimation here in Great Britain along the lines of the Society already in existence in the U.S. has thrown the spotlight on a subject which has been often discussed at gatherings of engineers, and about which various articles have been written, mainly on highly specialised facets of this very controversial subject.

The author has no pretensions to be a highly skilled estimating engineer, but has, after many years' experience on chemical plant operation and technical sales work, accumulated some knowledge of the subject and has decided views.

Firstly, it is interesting to reflect on why people want cost estimates made, and what they want them made for, the latter point being very important. Reasons for cost estimating and the types of estimate can be summarised in the following paragraphs.

In the first case there are the industrial giants of the chemical and petrochemical world, such as I.C.I., Distillers, Shell Chemical, Monsanto, etc., to cite a few examples. These companies all operate in an international market, often with agreements with chemical producers in other countries. These agreements extend not only into the fields of licensing and marketing of products, but also into divisions of sales territories, product territories, etc.

Costings made therefore must often be subject to overall factors which may seem entirely illogical to the outsider.

Amortisation

These giants will go very carefully into any possible new development with projected sales plans over a number of years and calculated amortisation plans which may involve selling at a loss to capture markets or at a large premium in captive markets to subsidise ventures in other territories.

Thus many abortive studies are made of this type and for purposes of planning cost estimating is of necessity of the roughest kind. Even in the light of the many factors involved and the number of schemes which are stillborn, it would undoubtedly still pay these companies to improve their cost estimating. This situation is further aggravated by the fact that many of them have large engineering construction departments, which are not used to working in a competitive market and which, after years of functioning as captive departments, largely work under a series of delusions as regards their efficiency both economics-wise and technical-wise. Many of them are so used to working along chemical-technological lines erecting 'chemists' dreams' consisting of scaled-up research laboratory processes, that cost factors fed back to their parent organisations are ludicrous to say the least.

The second type of cost estimating is that of the large contracting organisations, the names of which are undoubtedly familiar, not only to readers of the author's previous articles but to everyone in the business. These companies have much accumulated data on previous contracts they have undertaken, particularly in the field of petroleum plant, and this sort of company can quickly and accurately estimate the cost of a complete oil refinery or its various constituent process units within a matter of weeks, or even days, if necessary. They are used to buying in international markets and at competitive prices, they carry large staffs of experts who are able to assess the needs of their clients in the light of economics of the job.

Chemical Projects Slow Estimating Speed

However, when this type of company undertakes the erection of the increasing number of new and complete chemical and petrochemical plants, which they are being asked to do more and more frequently outside the range of their extensive oil refinery experience, the story is slightly different. While they are still able to do a good job for their clients, their estimating is less speedy and much less accurate, due to the large contingency allowances which have to be made in the design and fabrication of individual items of process equipment. Often data on these individual units are extremely sketchy, as possibly no one has made such a unit or a unit of such a size before. Also fresh data is often being produced from the research laboratories during actual execution of the contract which modifies or changes the thinking of the client. This sort of thing directly conflicts with the systematic organisation of these contracting companies as they have been in the past mainly used to working on oil and other process units where 'freezing of designs' can be carried out at an early stage, and one contract is not terribly different from another. Thus the slick organisation of this sort of company can often work against the economic conclusion of a particular contract, due to the lack of flexibility of the organisation, which has developed over the years. Also for smaller jobs of £100,000 or less, the organisation of this sort of company tends to be ponderous and uneconomic.

A third type of company which has need for cost estimating of the type dealt with in this article, is the major equipment firms which manufacture equipment of the 'one-off' type which can be very complex and expensive. This company often has specialist knowledge of a particular type of equipment or process which has been accumulated over the years, and while the company undoubtedly has a great deal of experience in that they probably have many successful items of equipment working in previous plants, it does not necessarily follow that the equipment is the most efficient or economic.

In fact, many of these companies have come into the field of chemical engineering almost by accident. In the main, they almost all started as fabricating firms who in the past, by geographical coincidence or other means, were asked by a chemical firm to make a piece of equipment. Possibly then by design or coincidence they were placed in the position of having to manufacture a second item or plant of the same type, and then a third or fourth. Thus they can justly claim to have a specialised experience, and they can also attract other business, either by pointing this out to potential clients or by recommendation. They can therefore establish a position from which they dominate a sector of chemical plant manufacture.

Based on Previous Work

Cost factors which they work on are based on previous plants which they have manufactured, as they have no other experience to draw on. If they were to examine their designs chemical engineering-wise, much room for improvement could undoubtedly be found. It must be remembered that chemical engineering is very much a post-war subject and much knowledge has been accumulated in recent years and is now easily available. While all the accumulated experience of years obviously cannot be thrown aside, if the chemical plant industry were to examine its designs or methods of working, huge economies could doubtless be made with also consequent improvements in designs and efficiency, both of the actual plant and in the methods of working of the firms producing the plant. This could well have repercussions both in the user and contracting firms.

(Continued on page 212)

F.B.I. President Discusses Exports at Benn Brothers' Dinner

Left to right: Sir William McFadzean, F.B.I. president, Mr. Glanvill Benn, chairman, Benn Brothers Ltd., Lady McFadzean and Mrs. Benn

DISCUSSING export problems at the annual dinner of Benn Brothers Ltd., publishers of CHEMICAL AGE, on 27 January, Sir William McFadzean, president, Federation of British Industries, spoke of his knowledge of the important contribution that the group's journals had made to the life of Britain. He suggested that the help of those journals had never been more necessary than it was today, particularly in the field of exports.

Britain could and must increase her proper share of world trade and he was confident that this was possible provided there was that national co-operative effort and dedication essential to the task.

As reported in our leading article, p. 205, Sir William said the aim was not to capture an undue proportion of world trade, but an extra 2 or 3% to bring our share up to say 20%.

He added "What a part you can play through industrial journals with the high reputation these carry everywhere in keeping this vital problem of exports in perspective; in encouraging everyone to play their full part; and in advertising British goods and achievements." Britain exported some 52,000 trumpets and wind instruments in 1960—but how many of those did we blow about British effort and accomplishment?

'Outsider' Sums up Career Prospects for I.C.I. Engineer Graduates

ONE of the difficulties faced by a large company in recruiting staff is to give young graduates, both arts and science, a picture of what it is really like to work for such a large concern. Naturally the traditional type of recruitment publication is suspect from the point of view of the graduate. However fair the company is trying to be, it is bound to give a rather rosy picture, but there will be disadvantages as well, if only the adjustment a young graduate must make in coming straight from university into the much less rarefied atmosphere of industry.

I.C.I. are tackling the problem by the publication of a series of booklets based on the reports of distinguished 'outsiders' who were asked to visit the manufacturing divisions and talk to as many members of the staff as they wished. They were given complete freedom to ask as many questions as they liked and to report with complete impartiality not only their praise but also their penuries and complaints.

The second booklet in the series, 'A High Degree of Engineering', is the report of the journalist, Mr. F. B. Roberts, editor of *Engineering*, who interviewed privately some 200 I.C.I. engineers, who appear in the report under the anonymity of Mr. A to Mr. Z.

In addition to giving a picture of the type of work an engineer does at I.C.I., Mr. Roberts records their attitudes to salaries, living conditions and amenities and what it is like working for a very large organisation. On salaries, it is stated that I.C.I. engineers are paid more than is general, and few of the engineers interviewed suffered from the feeling that their individuality was being swallowed up by a large organisation. They identified themselves with a particular part of I.C.I.

The report sums up by saying that the I.C.I. engineer is continually being challenged to give of his best, since he is working on a process which is susceptible to continuous development as opposed to an engineering product which remains static in design for several years.

Copies of this publication and the first in the series written for arts graduates by Kenneth Harris of *The Observer* are available from the Recruitment Section of I.C.I., Millbank, London S.W.1.

Dunlop Re-organise Chemical Sales Force

To handle increased business, the sales force of Dunlop Chemical Products Division has been divided into two sections, one dealing with adhesives and compounds, the other with polymers.

The adhesive and compound side is responsible for the sale of the range of Dunlop adhesives, latex compounds for the dipping, moulding and casting industries, carpet backing compounds for tufted and conventional carpets, and compound rubber. The polymer section is responsible for the sales of Polimul p.v.a. and acrylate emulsion used in the paint, paper, textile, leather and adhesive industries and for Dunlop Politone and Gentac latices.

I.C.I. Price Cuts Worth £10 Million

OVER the past three years prices of I.C.I. products have been reduced by something like £10 million. This was stated by Mr. G. K. Hampshire, I.C.I. group director, when he spoke at a recent dinner of Wilton Works foremen.

Mr. Hampshire described 1960 as a boom year, certainly the first eight months. Nearly £120 million had been spent at Wilton in previous years and a great deal of it was just getting going at full output.

Acid-laden Lorry Stolen at Bradford

A NEW maroon-colour lorry laden with 70 carboys of sulphuric acid intended for Birkenhead and Liverpool was taken from Sutcliffe and Gledhill Ltd., chemical manufacturers, Westfield Lane, Idle Moor, Bradford, during the night of 25 January. The lorry and load were worth about £2,000.

The lorry was found abandoned near Kendal the following night and was towed into town, the engine being badly damaged. The carboys were found on Malham Moor and have been returned to Bradford. Most of them were smashed.

'Guestimation'

(Continued from page 211)

Besides the industrial giants mentioned above, who do their own cost estimating, there are many smaller companies which put up chemical plant on a fully or semi-'do-it-yourself' basis. Cost estimating in these sort of firms, unless they happen to employ a particularly competent or experienced individual, does not exist, and the less said about it the better.

There is a crying need for some sort of rationalisation of cost estimating so that accurate data is readily and easily available to a very wide section of industry. Much money would be saved by all sections if such data were available. Unfortunately, the situation is not likely to be remedied in the foreseeable future because of the secretive attitude and unenlightenment of the British industry.

MODERN CHEMICAL INDUSTRY IN U.K.

Industry's Main Concern is Manufacture by Synthesis says I.C.I. Director

THE essential characteristic of the modern chemical industry is that it is primarily concerned with the manufacturing compounds by synthetic routes which can only be established through quantitative chemical science. Dr. James Taylor, M.B.E., F.R.I.C., a director of Imperial Chemical Industries Ltd., admitted that he was risking a generalisation when he made the above statement but felt justified in doing so as a result of his consideration of the development and scope of the chemical industry.

Dr. Taylor was delivering the first of three Cantor lectures entitled 'Towards a philosophy of the modern chemical industry' to the Royal Society of Arts on 23 January. The lectures are on the theme 'The modern chemical industry in Great Britain.' To reach such a definition of the chemical industry, he had considered the history of the industry and its present structure, and also the difficulty of giving a precise definition at all.

Inorganic chemistry was the branch of the science which was first systematised and quantified and it was the inorganic chemical industry which first acquired the characteristics which we now recognise as inherent in a scientifically based industry. In Dr. Taylor's view, the present large scale chemical industry has its roots in the Haber process, which was developed for warlike purposes, but at the same time, realised man's dream of abundant fertilisers from the air.

Mentioning several processes—the production of nitric acid, ethanol and methanol, the Fischer-Tropsh and the 'oxo' process—Dr. Taylor said that he thought they were sufficient to show that modern chemical processes increasingly comprise synthetic routes which demand a profound knowledge of the chemical reactions involved and very advanced technologies, and it was inevitable that the employment of physical chemists and physicists, who are concerned with investigating physical properties and effects, would alter the nature of the chemical industry: this is occurring.

The essential additional feature of the chemical industry—that the processes are carried out on a very large scale and modern plants turn out not grams but often thousands of tons per week—was dealt with in the second Cantor lecture given on 30 January, 'The springs of progress.' The design and construction of such plants involves complicated and difficult techniques, often with new materials of construction and highly sophisticated instrumentation and control, of a nature which were not available until science had developed adequately its technological functions. The plants are extremely costly and can only be financed by powerful concerns which can afford to wait a few years before the plants come into beneficial production.

The chemical industry the world over includes a number of very large organisations which may arise in a number of ways—by merger of a number of chemical firms as in the case of I.C.I. or by direct incursion of an already powerful company as in the case of the Royal Dutch/Shell Group.

I.C.I. was formed by a merger of British Dyestuffs Corp., Brunner Mond, Nobel Industries, and the United Alkali Co. All four companies had powerful scientific and technical resources, and their technical affairs were carried out by scientists, but their boards included mainly men of affairs. At the present time there are 16 full time executive directors, of whom 13 are professionally trained scientists.

At the time of the formation of I.C.I. it was estimated that not more than £½ million per annum was spent on research and development, whereas in 1959 the expenditure was over £41 million. The capital and surplus assets have increased from £65 million to £660 million and the annual capital expenditure in plant, equipment and property from £5 million to nearly £42 million.

The Royal Dutch/Shell Group is a good example of a large organisation being formed by the direct incursion of an already powerful company. In 1927 the company set up a chemical industry department which since then has expanded until its products include solvents, detergents, fertilisers, glycol, glycerine, resins, plastics, synthetic rubber, sulphuric acid, sulphur, ammonia, anti-oxidants and carbon black. These developments have led recently to the formation of a separate integrated chemical organisation.

Other large chemical organisations in the U.K. illustrating different methods of formation mentioned were Courtaulds who started in the textile field and entered the chemical industry via the rayon industry and Distillers who came in via fermentation and the manufacture of alcohol for industrial uses, and—a method which has become intensified in recent years—the large scale U.S. chemical concerns undertaking manufacture in the U.K. via a subsidiary or a partner.

Record U.K. Chemical Exports

(Continued from page 205)

Our exports to Europe, therefore, have been increasing at more than double the rate for exports of chemicals to all destinations. On the other hand, the largest market for British chemicals, the Commonwealth, increased by only half the overall rate. Shipments to Commonwealth countries in 1960 were valued at £134 million, a rise of 4.6% on the 1959 figure of £128 million. The disparity between the growth rate of trade with Europe, where for the bulk of our exports tariff barriers are rising, and our traditional markets underlines the fact that while maintenance of Commonwealth trade is vital—for it accounts for 42% of our total chemical exports—growth in our export trade must be looked for in the world's highly industrialised areas.

In this respect it is interesting to see that exports to the Soviet Union, valued at just under £6 million, showed an increase of 110% over 1959, bearing out earlier expectations that the U.S.S.R. held promise of valuable trade in chemicals. On the other hand, exports to the U.S., valued at £10.6 million were down by 8.5% (compared with a rise of 47.4% in 1959). Imports from the U.S. grew to the staggering total of £50.5 million, a 50% increase, and double the growth rate of 1959.

While 1960 chemical exports were again a record, it is clear that it will be hard going to improve on this position in 1961. The effort must be made however and there is no doubt that based on its past record, the British chemical industry will not be found wanting.

The alternatives are not pallatable. They were enumerated by Sir William McFadzean, president, Federation of British Industries, at the annual dinner of Benn Brothers Ltd. last week (see also p. 212): (1) a reduction of living standards instead of the steady growth hoped for; (2) a restriction on imports, a retrograde step to the desirable development of world trade; and (3) our not being able to make our full contribution to essential overseas investment.

Sir William saw that the problem was not to capture an undue proportion of world trade, for Britain has neither the capacity nor manpower for that. It is to recapture and maintain our proper share of world trade —that extra 2 or 3% to bring our share up to say 20%. Then we could face the present with satisfaction and the future with confidence.

Croda GmbH Salesmen Visit U.K. Works

TEN area sales representatives of Croda GmbH, Dusseldorf, flew into Ringway Airport, Manchester, on 9 January for a five-day visit to this country to witness the production and sale of Croda products in the U.K. in order better to tackle the German market. They were met at the airport by Mr. F. A. S. Wood,

Bottom left is F. A. S. Wood, chairman and managing director of the Croda Organisation. Second from bottom, right, is N. R. Kirkby, sales director, Croda Ltd. and behind him D. G. N. Crowe, director of Croda Organisation

chairman of the Croda Organisation Ltd. and Mr. N. R. Kirkby, sales director of Croda Ltd., the principal group operating subsidiary.

Visits were made to the Croda Ltd. works at Rawcliffe Bridge, the Croda research establishment at Snaith and discussions and lectures at Cowil Hall, group headquarters, at Snaith, Yorks. They saw Croda products in use at the Rover car works, Solihull, the Steel Company of Wales, Port Talbot, and Yardley's cosmetic works.

Croda GmbH are a wholly owned subsidiary of the Croda Organisation Ltd., who are the parent company of a world-wide group. There are associate companies in the U.S. and Italy as well as many operating divisions in the U.K.

Anti-knock TML Exempt from Import Duty

ANTI-KNOCK preparations containing not less than 45% and not more than 65% by weight of tetramethyl-lead (but not containing tetraethyl lead) have been exempted from Import Duty from 1 February until 1 April 1961. This is effected in a new Treasury Order, the Import Duties (Temporary Exemptions) (No. 1) Order 1961, available from H.M.S.O., price 3d as S.I. 1961/129.

The same order provides for the exemption from import duty from 1 February to 1 October 1961 of a range of chemicals, including sorbic acid and potassium nitrite.

Pernis Plant Will Produce 160,000 T.P.A. of Shell No. 1 Fertiliser

DETAILS of the new plant planned to be brought into operation near Rotterdam for production of Shell No. 1 compound fertiliser have appeared in the Dutch house journal of the Royal Dutch-Shell group. The unit, to be completed by mid-1962, will have an approximate annual output of 160,000 tonnes of fertiliser. It is to be erected by the N.V. Mekog concern, of whom two-thirds is owned by the Royal Dutch-Shell group company N.V. De Bataafsche Petroleum Maatschappij and one-third by the Dutch ferrous metals company Koninklijke Nederlandsche Hoogovens en Staalfabrieken N.V., who already produce compound fertiliser in part of their calcium-ammonium nitrate works at Ijmuiden. Site of the new plant will be the Second Petroleum Harbour in the Rotterdam industrial suburb of Pernis. Day-to-day management of the unit is to be by another Royal Dutch-Shell subsidiary, Shell Chemische Fabrieken N.V., the plant being situated within the grounds of the oil refinery of Shell Nederland Raffinaderij N.V.

Mekog have for some years been carrying out research in the compound fertilisers field, development of a product with high concentration, complete solubility in water and easy to strew being aimed at. After successful experimental production had been carried through of such a product at the Mekog laboratories at Rooswijk, it was in 1959 decided to rebuild part of the Ijmuiden calcium-ammonium nitrate plant to permit compound fertiliser production there; such production has now been under way since last April. Before introducing the new product—which bears the name of Shell No. 1, Compound Fertilizer 17-11-22—Mekog undertook, at the wish of the Shell marketing organisation, research directed at bringing the product on to the U.K. market. Shell Chemical Co. Ltd. are now introducing the new fertiliser to U.K. buyers (see CHEMICAL AGE, 21 May 1960, p. 841).

The Shell No. 1 is composed of 17% nitrogen, 11% phosphoric acid and 22% potassium. Its designation "No. 1" indicates that Shell are proposing to bring further nitro-phospho-potassium fertilisers into their production programme.

The decision to build in Pernis, passed by the Mekog board in May of last year, was based on the fact that the existing Mekog plant has now been extended to the maximum degree and because the mainly export distribution of the new fertiliser makes it desirable that seagoing ships should be loaded on the production site. The Pernis site will consist of the fertiliser plant itself, as well as a nitric acid unit, stores for raw materials and the finished product and loading and unloading centres. Ammonia production will remain centred at the Ijmuiden plant, output to be increased to meet expected higher consumption of the end product. Part of the Ijmuiden ammonia output will be transported to Pernis for further processing. Large-capacity ammonia tanks in spherical form are to be erected at both Ijmuiden and Pernis.

Local Councils Petition Parliament on Canvey Island Pipeline Risks

FEAR of the consequences of any possible leakage of inflammable liquids and gases from pipelines passing through urban areas lie behind petitions presented to Parliament this week by the London County Council and 14 other local authorities, who are suggesting that drastic changes in the Trunk Pipelines Bill. This Bill, which has been promoted by Trunk Pipelines Ltd., provides for the construction of pipelines from Canvey Island to terminal points in London and then on to Denham.

The L.C.C., in their position express grave doubts, despite the care which the company could be expected to take, "whether the risk of leakage can be eliminated entirely". They point out that the release of liquid under pressure could result in the heavy contamination of a wide area and claim that the Bill does not make adequate provision to enable them, as a fire fighting authority, to impose specific structural requirements to limit the risks. They suggest that the size, composition and design of the pipes should be specified in the Bill. "In view of the number of authorities involved it is of the utmost importance in the interests of the safety of life and of property that a uniform standard should be adopted in the construction of pipelines and that no such pipelines should be laid in an area such as London unless the liquids or substances which may be conveyed, and nationally determined minimum safety standards, have been previously prescribed."

New Research Team to Explore Gas Making Ideas

A NEW basic research group, which will be expected to develop entirely new ideas for the production and utilisation of gas, is to be established at the Gas Council's London Research Station at Fulham. The group will investigate "any new aspects of scientific discovery which might lead to the development of new processes for gas manufacture, distribution and use". (See also 'Distillates', p. 208.)

Overseas News

HOUDRY DEVELOP DEALKYLATION PROCESS GIVING HIGH YIELDS OF BENZENE

A NEW catalytic dealkylation process named Detol has been developed by the Houdry Process Corporation, Philadelphia. Detol is a highly selective process producing close to theoretical yields of benzene when dealkylating alkyl benzenes such as toluene and xylenes. First licence for the new process has been granted to Crown Central Petroleum Corporation, Baltimore and Houston.

Crown Central are building a Detol plant designed to produce 17 million gall. of benzene a year. Engineering and construction will be handled by Catalytic Construction Co., Philadelphia, and the plant will be in operation by mid-1961.

The process may be used for dealkylating toluene, xylenes, mixtures of the two, or alkyl benzene concentrates containing paraffins, olefins and sulphur compounds. It converts non-aromatics and organic sulphur compounds, such as thiophene, to light hydrocarbons and hydrogen sulphide. In addition to providing for the unusually high benzene yield, the Detol process is said to be easy to control and relatively inexpensive to operate. Benzene produced by the process has a freeze point of 5.4°C or better. It meets the required acid wash and corrosion tests, and contains less than one part per million of thiophene.

Swedish Esso Acquire Polypropylene Licence

The Swedish oil company, Svenska Esso, has acquired from the Italian Montecatini concern a licence to manufacture and sell polypropylene on the Scandinavian market. Svenska Esso intend to build a plant in Stenungsand, close to a cracking unit now in the planning stage. The installations are expected to be ready by mid-1963.

Hoechst to Raise Capacity

Farbwerke Hoechst AG plan to expand considerably capacity for pinanhydroperoxide at their Gersthofen works. The product is used in the 'cold' process for the manufacture of synthetic rubber. Sales of the expanded production are reported to have been guaranteed to Bunawerke Hüls GmbH, synthetic rubber producers, Marl, and to other concerns. The expanded plant will also be able to produce other hydroperoxides.

Bayer Interest in First S.A. Aspirin Plant

Production has begun at the San Nicolas plant of Fensud Fabrica Argentina de Fenol y Derivados S.A., of Buenos Aires, of the first salicylic acid to be manufactured in South America. The acid, to be used for the production of aspirin, will be produced at an initial annual rate of 500 tonnes by a Farbenfabriken Bayer process from synthesis phenol, also by a Bayer process, in the same plant. Fensud are a joint subsidiary of Bayer and the Argentine Bunge and Born group. Enough acid and phenol will be produced at the San Nicolas plant to cover all national demand. Aspirin produced will be marketed by the Bayer subsidiary Proindar S.A.

Monsanto to Increase Vinyl Chloride Capacity

A 50% increase in vinyl chloride monomer capacity—to 150 million lb. per year—is under construction at the Texas City plant of Monsanto Ltd. The expansion is nearing completion and is expected on stream by July of this year. Raw materials, ethylene and acetylene, are already available on the Texas City site and additional supplies of ethylene will be brought from the company's Chocolate Bayou project next year.

German Aid for Mexican Nylon 6 Project

Celanese Mexicana S.A. have signed a contract with the Rorschach, West Germany, company Feldmühle AG for technical aid, mainly in connection with the production of nylon 6. The agreement was signed after Celanese Mexicana had announced plans to build a new nylon works at Ocotlán in Mexico.

Cabot Carbon Black Plant for Argentina

Cabot Argentina, the Argentine subsidiary of the U.S. firm Cabot Corp., plan a 30 million lb. per year carbon black plant at Campana. The plant, costing $4 million, will supply Argentina's total demand for carbon black of 20 million lb. per year and the rest will be exported to other Latin American countries. Construction will be complete later this year.

Cabot's carbon black plans in Europe were tabled in the C.A. Common Market survey of 7 January.

East German Oxygen Plant for India

India is reported to have placed orders with the Soviet-controlled area of eastern Germany for equipment and plant for an oxygen production plant to be brought into operation at Bombay.

Merck Sharp Join French Firm to Make Drugs

Merck Sharp and Dohme International and the French pharmaceutical company, Laboratoires Delagrange, have acquired joint ownership of the French chemical firm, Synorga, S.A. The company is to be renamed Compagnie Chimique Merck Sharp and Dohme, S.A., and will produce vitamins, organic chemicals, steriod hormones and Amprolium, a coccidiostat for poultry. The present plant is to be expanded for the purpose.

The two companies have also set up a joint pharmaceutical company in Paris, Laboratoires Merck Sharp and Dohme, S.A., which will manufacture drugs developed in the U.S. at the Merck labor tories.

Big Increases in Polish Plastics and Rubber Output

Over 1960 Poland expects to have increased chemical output by 19%. At the top of the list of chemical achievements stood plastics outputs of 45,000 tonnes, or almost double that for 1959, synthetic rubber production of 20,000 (5,800) tonnes, some 45% more phenol, 20% more chlorine and 14% more soda (510,000 tonnes) than in the previous year. During 1960, it is planned to raise output of plastics to 64,400 tonnes and of synthetic rubber to 31,000 tonnes.

Hercules Second Polyolefin Unit Planned

Construction of a second polyolefin unit which will double the existing plant has been started by Hercules Powder at Lake Charles, La. The first unit is expected to come on stream next month with an initial capacity of 60 million lb. per year. When the second unit is completed early in 1962, Hercules total capacity for polypropylene and linear polyethylene will be 200 million lb. per year. Either plant can make either polyolefin.

Swedish Chlorine Plant to Double Capacity

The Swedish chemical and cellulose producers Svenska Cellulosa A/B plan to expand chlorine capacity at its Ostrand plant near Sundsvall from 16,500 to 31,000 tonnes/year. Expansion will be complete by the end of the current year, foreseen investment totalling 10 m. Swedish crowns. The plant's capacity could be raised further to 55,000 annual tonnes.

Sour Gas Pipeline and Processing Project in Alberta

Details of a proposed $11 million sour gas transmission line and processing plant were outlined to the Alberta Conservation Board in a joint application by Saratoga Processing Co. Ltd. and Jefferson Lake Petrochemicals of Canada Ltd. The applicants propose to build a 54-mile, 16-in. sour gas pipeline from Alberta's Savanna Creek gas field to Coleman, Alta., a gas processing plant and a sulphur recovery plant to be located three miles west of Coleman.

Gas production from Savanna Creek is under contract to West-coast Transmission Co. Ltd. parent company of Saratoga Processing. Westcoast, in turn, will sell the gas primarily to El Paso Natural Gas Co. at a point near Spokane, Washington. After processing at the Coleman facilities the gas would be delivered through the Alberta Natural

Gas Co. Ltd. and Pacific Transmission Co. Ltd. pipeline facilities to existing facilities of El Paso at Spokane.

Westcoast has contracted to purchase the residue gas at an average rate of 43 million cu. ft./day. Saratoga Processing would operate the pipeline and gas processing plant and Jefferson Lake would operate the sulphur recovery plant.

The proposed facilities would provide for peak production from Savanna Creek in excess of 75 million cu. ft./day of gas. A field production rate of 71 million cu. ft./day, maximum rate initially, is expected to yield 53,750,000 cu. ft./day of residue gas and more than 300 tons of elemental sulphur.

Production of liquid hydrocarbon by-products is expected to be nominal and will be used for plant fuel requirements.

West Germany's Big Overseas Investments in Chemicals

According to the Ministry of Trade, Bonn, West German investments abroad over the first half of last year included DM38,900,000 for the chemical industry and DM11,100,000 for chemical trading. A further DM4,500,000 was invested in the petroleum industry of other countries and DM2,300,000 in petroleum trading. Chemical industry investments were the highest of those for any one branch of industry or trade and accounted for 24.2% of the overall total.

New Chemical Plants in Yugoslavia

Plants for the manufacture of calcium carbide and calcium cyanide have started production at the Jugohrom Chemical and Metalurgical Works, of Jegunovci, Yugoslavia. The units, employing modern processes, use equipment supplied mainly by the Yugoslav firms of Rade Koncar and Jugomontaza.

1,480 Mile Pipeline Proposed in Mexico

The U.S. concern International Gas has proposed to Petroleos Mexicanos (Pemex) the construction of a gas pipeline from Reynosa west through the Mexican industrial towns of Monterrey, Saltillo, Parras, Torreon and Durango to Mazatlan, thence along the east coast of California Gulf to Mexicali and Los Angeles. It would extend 1,480 miles in Mexican territory alone, and would entail an investment in Mexico approaching £74 m.

International Gas stresses the advantages to Mexico of its proposal over the Tennessee Gas previous offer to build a pipeline from Reynosa to Mexicali approximately following the U.S. border and touching only at Ciudad, Juarez and Nogales.

Canadian Lithium Compounds Plant in Operation

The lithium chemicals plant of Quebec Lithium Corporation, Montreal, located adjacent to the company's mine and mill near Val d'Or, Quebec, is reported to have been brought into steady operation, following test runs after the start-up last October. Initially, the plant will concentrate on the production of lithium carbonate, of which it has a capacity to produce some 6 million lb./year, but production of lithium hydroxide is likely to be followed at a later date.

The process employed is a new one, developed by the Quebec Department of Mines. Batch tests carried out on the plant are stated to have confirmed the economics and workability of the process. Lithium carbonate of up to 99.6% purity has been attained and laboratory tests indicate that higher purities may be reached as the plant settles into routine operation.

Goodrich-Gulf to Build Polybutadiene Plant

The U.S. company, Goodrich-Gulf, expect to have a capacity of 20 million lb. per year of polybutadiene on stream by the end of the year. Institute, W. Va has been chosen as the site for the new plant.

Goodrich-Gulf had considered building a polyisoprene plant with a capacity of 25,000 tons a year at Orange, Tex or Institute but have changed their plans because they felt that the market potential for polybutadiene was greater than that for polyisoprene. The company will not build facilities for butadiene but will use part of their styrene-butadiene plant at Institute.

Atlas Powder Plans Merger with Stuart

Atlas Powder are planning to acquire Stuart Co. in exchange for stock. Stuart's are manufacturers of ethical products including analgesics, vitamins, diet control aids and tranquilisers. A memorandum of intent to merger has been signed by officials of both companies for presentation to the two boards of directors and the shareholders. Atlas have been doing basic research on ethical drugs for some time and the acquisition of Stuarts would give them an outlet for these.

Two New Epoxy Resins from Dow Chemical

Two self-extinguishing epoxy resins have been added to the Dow Chemical range. They are X-3442 and X-3441.1 and are available in production quantities for initial field development. According to Dow, bromine has been incorporated without seriously degrading other properties. A bromine concentration of 15 to 25% will make even unfilled castings self-extinguishing, but it is not revealed how bromination is carried out without degrading mechanical and physical properties.

X-3442 is a semi-solid containing about 49% bromine and is for use in blends with conventional liquid epoxy resins. X-3441.1 is a solid with 19% bromine for use either alone or in blends with a solid resins.

The price range of X-3442 is $1.25 to $2.01 per lb., and for X-3441.1 it is $1 to $1.76 per lb.

£6 M. Chemicals from Natural Gas Venture in Canada

A five-company group has applied to Alberta Conservation Board for permission to build a $6 million plant to process gas from Alberta's Wildcat Hills field. Application has been filed by Western Leaseholds Ltd., subsidiary of Canadian Petrofina Ltd., on behalf of itself, Imperial Oil Ltd., Shell Oil Co. of Canada, British American Oil Co., Ltd., and Hudson's Bay Oil and Gas Ltd.

The proposed plant would be located approximately 35 miles north-west of Calgary and would include facilities for gas treating, hydrocarbon recovery and condensate stabilisation, as well as a sulphur recovery unit.

It is anticipated that the plant would deliver initially 45 million cu. ft./day of processed gas.

Polystyrene Prices Cut

Dow have cut their polystyrene prices to meet competition. From 1 January they have been charging 19 cents a lb. for truck loads of general purpose resin —a penny above the industrial price. Dow's expressed the opinion that the depressed prices cannot but harm the future of polystyrene.

This cut in Dow prices follows the unsuccessful attempt of Du Pont to put up the price of polythene (see CHEMICAL AGE last week).

Allied Chemical Plan Melamine Plant Based on New Urea Process

MELAMINE production is planned by Allied Chemical who are looking for a site on which to build a plant with a capacity of over 20 million lb. a year. Production, based on urea, is expected to begin early next year.

Allied Chemical already hold a licence for basic production from American Cyanamid, but they say they have developed a process of their own which they began working on 20 years ago, apart from the biuret process patented in 1953.

Most of the plant's output will be for captive use for Allied's resin operation at Toledo, Ohio, which was doubled in capacity last September, but the firm intends to market an increasing amount of melamine as production rises. There is an increasing demand for melamine resin for the manufacture of tableware.

Allied have previously bought their melamine from American Cyanamid and will continue to do so until their facilities are on stream. Cyanamid, biggest U.S. producers of melamine, were charged by the Justice Department with monopoly and restraint of trade in melamine. They are starting up new facilities which will bring their total capacity to 100 million lb. per year. Cyanamid make melamine from dicyandiamide made by their Canadian subsidiary.

Bookshelf

CHEMISTRY AND APPLICATIONS OF ORGANOSILICON COMPOUNDS

SILICONES. Edited by *S. Fordham*. George Newnes Ltd., London, 1960. Pp. x + 252. 36s.

This book consists basically of a collection of articles by a number of specialist workers of I.C.I.—one of the two U.K. producers of silicones—and the editor is to be congratulated on the competent way in which these articles have been brought together to form a continuous entity.

After a brief historical introduction, some 70 pages are devoted to the chemistry of organosilicon compounds. This necessarily condensed account provides a useful general reference to the various reactions involved in the preparation of silicones, and is supported by 221 references. A further section deals with the structure and properties of silicones (153 references).

The latter part of the book, comprising rather more than half, is concerned with the industrial manufacture and application of silicones, starting with a brief chapter on world production and market prospects. The 'direct' and Grignard processes of silicone manufacture are described and there are separate chapters on silicone fluids and lubricants, rubbers, and resins. The concluding pages on applications of silicones are sketchy and draw heavily on American references, as does, indeed, the work as a whole. Some discussion of the work on silicone applications carried out by various research associations in the U.K. would have been welcome.

The few diagrams are effective and some useful tables on silicone properties are included; the eight photographic plates add little to the value of the book and half of them will be very familiar to those who have seen the silicones sales literature. The book is reasonably priced and should be a useful reference to organosilicon chemistry for the non-specialist, as well as a handy source of background information for the specialist.

Chemical Engineering

CHEMICAL ENGINEERING PRACTICE, VOL. 10, ANCILLARY SERVICES. Ed. by *H. W. Cremer* and *S. B. Watkins*. Butterworths, London, 1960. Pp. vi + xx. 100s.

The majority of the more comprehensive books on chemical engineering in English come from the U.S. The present series was inaugurated to remedy this deficiency. From this point of view the present volume is particularly useful because the conditions under which ancillary services are provided for chemical plant in U.K. and U.S. differ greatly. For instance, in this country there is no equivalent fuel to natural gas. The volume is divided into: Fuels (123 pages) R. A. A. Taylor, H. Bardgett, L. J. Edgcombe, J. H. G. Carlile, L. J. Jolley; Combination Systems (63 pages), A. Fitton, A. B. Whiteley; Steam (114 pages), G. Cooke, E. B. Whittaker; Electrical Installation (62 pages), Sir Henry Clay; Water Supplies (111 pages), J. Kennard, A. H. Waddington, W. J. M. Cook; Effluent Treatment and Disposal (133 pages), B. A. Southgate, A. Parker. It is a sign of the times that the last section is the longest.

This book is clearly intended for the chemical engineer; it does not set out to inform the experts in the fields considered. The student should read a book such as this so that he can appreciate the contributions that his specialist colleagues can make to the design of plant and so that he will know the right questions to ask. The practicing chemical engineer will use it to ensure that he is aware of the best current practice. Necessarily there is little fundamental theory in this book and few will read it right through. Most chemists would find something to interest them. The volume is a useful addition to the series.

Waste Treatment

WASTE TREATMENT. Edited by *Peter C. Isaac*. Pergamon Press, London, 1960. Pp. 477, 84s.

This book is an account of the second symposium on the treatment of waste waters held at King's College, Newcastle upon Tyne in September 1959, and consists of the texts of the 21 lectures given with accounts of the resulting discussions, followed by an appendix containing a brief description of the Craigmillar works (City of Edinburgh) which was visited by the participants and a list of the latter Twenty-two pages are expended on a comprehensive subject and author index.

The lectures and discussions are divided into groups: introductory; biological treatment practice; sampling and analysis; sludge treatment (particular industries); and reclamation. The introductory section amounts to a course in the biochemistry and ecology of micro-organisms found in sewage plants, and the use of manometric methods. It could be valuable to the lay person though in parts the text may mislead such a reader, e.g. the short account of free energy changes on page 12. In parts the use of jargon detracts from the clarity, and the use of symbols in non-conventional ways makes the reading difficult in places. The more technical sections taken together give a picture of the problems, and ways of dealing with them, of a considerable industry.

The book should be available to everyone concerned with the disposal and treatment of waste materials, and is a mine of information for others. Study of it by producers of waste materials could only bring realisation of the problems, due to their activities, which have to be dealt with by the community.

Organic Chemistry

LEHRBUCH DER ORGANISCHEN CHEMIE. By *A. F. Holleman*, revised by *F. Richter*. 35th and 36th edition. Walter de Gruyter and Co., Berlin, 1960. Pp. xii + 646. DM28.

The very large number of editions which this book has undergone is a more concrete tribute to its value than any reviewer's comments. Some special features of this sound text are its experimental flavour, the attention which it pays to physicochemical concepts and the numerous stimulating digressions into topics of biochemical, pharmacological and industrial interest. The present revision is obviously based on a careful and balanced scrutiny of recent advances; for example, modern theories of reaction mechanisms and recent developments in natural products chemistry receive due attention. However, even the most skilful doctoring cannot entirely overcome the disadvantages of old age.

Perhaps the most serious deficiency of the book is that the material on some important theoretical concepts (e.g. mesomerism) tends to be rather scattered, sometimes without adequate cross references. It is also disappointing to see that physical methods for the determination of structure and modern stereochemical theory receive rather scant attention. However, despite imperfections, this is an excellent book. The price is very reasonable, especially by German standards.

Synthetic Methods

SYNTHETIC METHODS OF ORGANIC CHEMISTRY. By *W. Theilheimer*. S. Karger, Basle, 1960. Pp. xvi + 549. Sw.Fr110.

Like the previous volumes of Theilheimer, this new volume consists mainly of abstracts of recently published synthetic procedures. Most of the references are to papers published between 1957 and 1959. The abstracts are arranged according to the type of the reaction, and further guidance is provided by the subject index, which lists named methods, types of compounds and reagents. Taken as a whole, this series constitutes a valuable key to the literature of organic synthesis and each new volume is an invitation to profitable browsing; the short survey 'Trends in synthetic organic chemistry—1960' is of special interest from the latter point of view.

PEOPLE in the news

● **Mr. G. M. Smith,** construction projects manager at I.C.I.'s Wilton Works, will on 3 April take up a new appointment with the company's construction organisation at the Severnside works.

● **Mr. Rodney Kent** has been appointed deputy chairman of George Kent Ltd., Luton, and **Mr. Walter May** has been appointed assistant managing director. **Mr. John G. Vaughan, F.C.A.,** managing director of the Charterhouse Finance Corporation, becomes a director.

● **Mr. Kenneth Graham Holden,** chairman and joint managing director of Hardman and Holden Ltd., Manchester, has been appointed to the board of Borax (Holdings) Ltd., who recently acquired the Manchester company. Mr. Holden is also a director of Geigy (Holdings) Ltd., Williams Deacon's Bank Ltd. and the Royal Bank of Scotland.

● **Mr. Richard Adams, M.I.Mech.E., M.I.Chem.E.,** who has been appointed general manager of a newly created Engineering Division of Castrol Ltd., joined Castrol in July last year. He is an engineer with over 25 years experience with such companies as Monsanto Chemicals Ltd. (chief civil engineer), and Kellogg International Corp. (project manager). His last appointment was as manager, Mechanical and Electrical Engineering Division of George Wimpey and Co. Ltd. Senior buyer of the new Castol division is **Mr. S. G. Aves** (see also p. 220).

● **Mr. W. N. Menzies-Wilson** has been appointed a director of the Staveley Iron and Chemical Co. Ltd., and as from 1 May will be deputy managing director. **Mr. S. W. Martin** remains chairman and managing director.

● **Dr. G. F. Davidson,** head of the chemistry department is retiring from the British Cotton Industry Research Association.

● **Sir Walter Benton Jones** has retired from the board of Davey-Ashmore in order to make room for promotion. **Mr. M. F. Dowding,** general manager of the machinery division of the subsidiary, Davy and United Engineering Co. Ltd., has been appointed to the board of the parent company. As agreed in principle at the time of the Davy-Ashmore merger, **Mr. C. E. Wrangham,** formerly chairman of Ashmore Benson Pease and Co., and of P.G. Engineering, has resigned from the boards of these subsidiaries and **Mr. M. A. Fiennes** has been appointed chairman in his place. **Mr. Fiennes** is managing director of Davy-Ashmore.

A ceremony was held at the offices of Sharples Centrifuges Ltd. to mark the signing of the apprenticeship indentures of the first apprentice to be indentured since Sharples moved to their new works at Camberley, Surrey. In the photo, Mr. M. E. O'Keeffe Trowbridge, Sharples managing director, makes a presentation to the apprentice, Philip Bedford

● **Mr. S. P. Chambers,** chairman of I.C.I., left London on 29 January on a visit to India and Pakistan. Due to return on 19 February, it is his first visit as chairman to the offices and factories of the I.C.I. subsidiaries, I.C.I. (India) Private Ltd. and I.C.I. (Pakistan) Ltd. He will be accompanied by Mrs. Chambers and his personal assistant, **Mr. Graham Turner.** Mr. Chambers will first visit the headquarters of the Indian company in Calcutta, later travelling to Delhi, Bombay, Madras and Colombo. During the latter part of his stay he will be the guest of I.C.I. (Pakistan) and while in Karachi is expected to meet the President of Pakistan, General Mohammed Ayub Khan, and members of the Government.

● The general manager of Scottish Oils Ltd., **Dr. G. H. Smith, Ph.D., F.R.I.C.,** has retired after nearly 40 years service. He will be succeeded by **Dr. W. B. Peutherer, Ph.D., F.R.I.C.,** general manager of the British Petroleum refinery at Grangemouth. Dr. Peutherer will be succeeded at Grangemouth by **Mr. J. G. Annan,** at present production manager there. Dr. Peutherer is a past chairman of the Stirlingshire and District Section, Royal Institute of Chemistry, and is chairman of the Scottish branch, Institute of Petroleum.

● **Dr. W. G. Schmidt, Dipl.Ing.Chem.Eth. (Zurich), D.Sc., D.I.C.,** joined Scott Bader and Co. Ltd., Wollaston, Wellingborough, on 1 February as chief chemist. He will be responsible for the research, development and analytical laboratories, engaged on fundamental work in the three main fields of the company's activities—polyesters, polymer emulsions and solutions and plasticisers, as well as in wider fields. He joins the company after eight years with one of the largest U.K. producers of synthetic fibres. Initially engaged in industrial research for Lonza AG, Switzerland, when he first came to U.K. Dr. Schmidt worked with a research team of chemical design engineers.

● **Dr. G. V. James, M.B.E., F.R.I.C.,** consulting and analytical chemist, Bristol, was elected chairman of the Western Section, Society for Analytical Chemistry, at the annual meeting held recently in Bristol. **Mr. F. H. Pollard** was appointed vice-chairman and **Dr. T. G. Morris, B.Sc., A.R.I.C.,** Brockleigh, Clevedon Avenue, Sully, Glam, was elected hon. secretary and treasurer.

● **Mr. P. T. Stephens** has been appointed chairman of the Saunders Valve Co. Ltd. to fill the vacancy caused by the death of Mr. J. C. Billingham. Along with **Mr. A. L. Trump,** Mr. Stephens will continue to act as joint managing director.

● **Mr. A. G. Cleghorn,** general works manager, Blackheath Works, Birmingham, and **Mr. W. H. Wentworth Ping,** general sales manager, Sheffield, have been appointed special directors of Firth-Vickers Stainless Steels Ltd.

Dr. I. S. Wilson, Monsanto's new senior scientist (see C.A., 28 January, p. 187)

● Under the new sales system of Dunlop Chemical Products Division (see page 212) **Mr. H. J. Northeast,** formerly sales manager, becomes general sales manager; **Mr. F. G. Delahoy,** formerly assistant sales manager, becomes sales manager, adhesives and components; and **Mr. J. D. Banks,** formerly technical salesman (North), becomes sales manager, polymers.

● **Dr. E. I. Akeroyd** has been appointed deputy managing director of the Permutit Co. Ltd. and **Dr. T. V. Arden** has been appointed a director.

● **Mr. F. H. Terleski,** chairman, **Mr. N. Williamson,** and **Mr. H. P. Wilson** are retiring from the board of David Thom and Co. Ltd., Manchester 6. **Mr. P. D. Wilson** has been appointed chairman and **Dr. J. T. Terleski, Ph.D., B.Sc.Tech., A.R.I.C.** and **Mr. A. Russell** executive directors.

● **Mr. I. G. Davis** and **Mr. J. E. Bounds** have been appointed executive vice-presidents of Gulf Oil Corporation, and **Mr. B. R. Dorsey** has been elected senior vice-president.

● **Mr. S. Watson** has been appointed Northern regional manager for Darlington Insulation Ltd., Darlington, responsible for supervising and co-ordinating the work of the company's branches in

(Continued on page 219)

Commercial News

- **Borax (Holdings) Group Profits Up 19%**
- **Hickson Pay More Than Forecast Final**
- **B.A.S.F. Loan Will Raise DM 100 Million**
- **Union Carbide–Swedish Polythene Company**

Borax (Holdings)

After depreciation of £2,041,461 (£1.991,756), group trading profits and other income of Borax (Holdings) Ltd. for the year ended 30 September totalled £4,361,470 (£3,660,445), an increase of 19%. Tax took £1,229,925 (£1,025,258) and net profit was up 22% at £2,867,236 (£2,344,040). A final dividend of 8½% is declared on deferred ordinary, which was increased to £9.5 million by the acquisition of Hardman and Holden Ltd., making 11½% (10%).

Last month the U.S. operating company, United States Borax and Chemical announced record sales, up 7%, and record net income, up 14% to $6.92 million.

For the three months ended 31 December, net income of the U.S. company was $1,112,874 ($1,456,909), or 23 cents (31 cents) a share. Sales totalled $15,656,438 ($15,704,970). Exports of borax were strong, but there are signs of a decline from that level. Outlook for potash is said to be favourable. Lower income is attributed to TV advertising of 20 Mule Team consumer products.

Hickson and Welch

Group profit of Hickson and Welch (Holdings) Ltd., after depreciation of £137,189 (£107,614) for the year ended 30 September was £643,986 (£568,020). Tax takes £305,167 (£261,054) leaving a net profit of £338,819 (£306,966). A final dividend of 11% is to be paid on capital increased by a one-for-four rights issue, against a forecast of not less than 10%. With an 8% interim on the smaller capital this makes a total of 19% (16%).

Permutit Co.

Directors of the Permutit Co. Ltd. report that the 1960 profits will be lower than those of the previous year owing to reduced sales. Orders in hand, however, "are very satisfactory". Interim dividend has been maintained at 7½%.

B.A.S.F. Loan

Badische Anilin- und Soda-Fabrik AG, Ludwigschafen-on-Rhine, are to launch a loan through the Deutsche Bank AG banking house, of Frankfurt-on-Main. The loan is of DM100 million, bonds being issued at 99% and carrying a 6½% interest. The loan extends over 15 years, of which five are interest-free.

Brooks Instrument Co.

The U.S. manufacturers of process measuring instruments, Brooks Instrument Co. Inc., have formed a Dutch subsidiary, Brooks Instrument Nederland N.V., at Veenendaal.

E.W.M.-France S.A.

The Munich, West Germany, chemical concern Elektrochemische Werke AG, have formed a French subsidiary under the name of E.W.M.-France S.A., at Colmar. With an initial capital of N.Fr.500,000, the company will produce peroxides at a plant to be built near Neuf-Brisach.

Chemstrand

Monsanto's proposal to acquire the 50% American Viscose Corporation interest in Chemistrand has met with the approval of over 90% of Monsanto's shareholders. American Viscose will receive 3,540,000 shares of Monsanto's stock in exchange.

Freeport Sulphur

Net income of Freeport Sulphur for 1960 was $13,193,537 ($14,477,796), or $1.75 ($1.93) a share.

French Chemical Loan

The financial consortium for the French chemical industry, Groupement de l'Industrie Chimique de Synthèse, plan an issue of a 5% loan at a rate of 99.5%. Sought is a sum of Fr76 million. Repayment of the loan, which will be issued in Fr200 parcels, will be within 18 years and at a rate of 114%.

Uni-Kemi AB

Union Carbide Corporation and the Swedish concern, Stockholms Superfosfat AB, have set up a joint subsidiary company in Sweden under the name of Uni-Kemi AB in connection with the proposed production at Stenungsund, Sweden, of 13,500 tonnes per year of polythene by the two companies working in co-operation.

Tellko

A majority interest in the Swiss photochemical firm of Tellko, Fribourg, has been taken over by CIBA AG, Basle.

Unifarma Acquired

The Portuguese pharmaceutical producers, Uniao Internacional de Laboratorios Farmaceuticos Ltda. (Unifarma), have passed into the hands of Investimentos Financeiros e Administracaos SARL (Finadil), of Lisbon, and C. H. Boehringer-Solm, of Canada, the former with 300,000 escudos and the latter with 200,000 escudos of the company's capital. C. H. Boehringer-Solm are part of the C. H. Boehringer group based at Ingelheim, West Germany, and it is understood that the same group holds a majority of shares in Finadil.

NEW COMPANIES

ALLPORT CONSULTING ANALYSTS LTD. Cap. £5,000. Directors: N. L. Allport and M. A. Allport. Reg. office: 325 Kennington Road, London S.E.11.

FERTILIZER PLACEMENT LTD. Cap. £5,000. Manufacturers of and dealers in liquid fertilisers, etc. First directors: D. M. Ramsay and Joan E. Ramsay. Reg. office: The Woodlands, Navenby, Lincoln.

HANDIGAS LTD. Cap. £100. Manufacturers of and dealers in oxygen, hydrogen, nitrogen, acetylene, carbonic acid gas, propane, butane and other petroleum gases. Subscribers: F. C. S. L. Lewis-Harris and L. S. Kinneat. Solicitor: C. A. B. Leslie, Bridgewater House, Cleveland Row, London S.W.1.

HUGHES AND HUGHES (ENZYMES) LTD. Cap. £100. Importers, exporters, merchants, manufacturers of and dealers in enzymes, chemicals, etc. Directors: M. C. Hughes, L. J. Taylor. Reg. office: 35 Crutched Friars, London E.C.3.

PONTYCLUN CHEMICAL CO. LTD. Cap. £100. Manufacturers of and dealers in chemicals, etc. Directors: R. T. Pemberton (director, Pressed Steel Co. Ltd., etc.) and Dr. E. I. Akeroyd. Reg. office: 272/276 Gunnersbury Avenue, London W.4.

People in the News

(*Continued from page 218*)

the north of England and in Scotland. **Mr. A. W. D. Pullar** has been appointed Southern regional manager, with similar responsibilities for branches in the Midlands, south of England and Wales. Both have been with the company for 22 years.

● **Mr. Stanley H. Goss** has been appointed joint managing director, with **Mr. L. G. Oxford,** of Firth Cleveland Instruments Ltd., Treforest, Glam, a member of the Firth Cleveland Group. Mr. Goss was appointed a director of Firth Cleveland Pumps when that company joined the group in 1959.

● **Mr. N. B. Smiley** has joined the board of Crookes Laboratories Ltd. and has been appointed chairman. **Mr. T. Jackson** and **Dr. C. J. Virden** have been appointed directors. **Mr. N. A. Campbell** and **Viscount Furness** have resigned from the board. The company is now controlled by Arthur Guiness Son and Co. and Philips Electrical Industries.

● **Dr. G. Ader,** a director of Artrite Resins, Ltd., has been appointed managing director.

● **Mr. Charles Hull** has been appointed, with effect from 1 February, general manager of Stanlow (Cheshire) refinery, Shell Refining Co. Ltd., in succession to **Mr. C. R. Middleton,** who retired on 31 January after 35 years' service with the Royal Dutch/Shell Group.

TRADE NOTES

I.C.I. Antioxidant Range

I.C.I. Dyestuffs Division have announced that Nonox B is now available in the form of short rods as well as in the normal powder form. In quality and strength the rods are exactly the same as the powder and may be substituted for it on a weight-for-weight basis in any given application, but since the short rod-like granules consist of solidified resin and not of powder aggregates, they do not disperse as readily as the powder form. I.C.I. Dyestuffs Division will be glad to supply users with samples.

Helman Chemical Products

Roland C. Heath Ltd., 33 Winchester Road, London N.W.3, have purchased all the stocks originally held by H. E. Helman (Insecticides) Ltd., and the company trading under the name of Helman Chemicals. The products of Helman (Insecticides) will still be marketed under their trade names, but will be manufactured and distributed in the future by Heath.

New Castrol Division

The Castrol Engineering Division has been formed to bring together and intensify the group's expanding engineering operations. These consist of the design, manufacture, installation and servicing of a very wide range of lubricating plant and equipment for both automotive and industrial applications. The new division includes the following four departments which are located at the Group's London headquarters, Castrol House, Marylebone Road, N.W.1: Lubrequipment (automotive lubricating equipment), mechanical appliances (industrial lubricating equipment), service, and drawing office.

I.C.I. Accelerators as Wet Cake

The Dyestuffs Division of I.C.I. have introduced the LS brands of Vulcafors DPG, MBT, ZDC, and ZMBT, which are specially prepared wet cake brands whose primary particles are of 1-2μ diameter. With the new LS brands, all that is necessary is a slurrying treatment with a dispersing agent in order to break up the soft agglomerates.

Changes of Name

Name of R.H.C. Reclamations Ltd., 2 Caxton Street, Westminster, London S.W.1, has been changed to R. H. Cole Plastics Ltd. This is entirely a manufacturing company for various plastics and moulding compounds. R. H. Cole and Co. Ltd., of the same address, handle sales.

G. H. Osborn Building Products Ltd., 551 London Road, Isleworth, Middx, have changed their name to Osma Plastics Ltd.

B.D.H. Small Orders

British Drug Houses Ltd., Laboratory Chemicals Division, Poole, Dorset, have issued a notice to the effect that in view of the rising delivery costs and the difficulty of completing scheduled road services under present traffic conditions they can no longer offer free delivery for orders of a smaller value than 20s. The delivery charge will be 5s if orders below 20s are sent by van, while a despatch charge of 5s will be charged for similar orders sent by rail or post.

Adhesion-resistant Material

A new type of material for use as protective aprons, conveyor belting and similar articles which need to have a completely non-adhesive surface is being developed by Heafield Industries Ltd. The fabric has a glass fibre base and has polytetrafluorethylene sintered onto it. It is non-toxic and chemically inert and resistant to solvents with the exception of molten alkali, molten metal, gaseous fluorine and gaseous chlorine trifluoride. Further details can be obtained from Heafield Industries Ltd., Spa Lane, Derby.

Light-scouring Wool Oil

As a result of their policy of continuing research and wide experience of the wool trade, James Briggs and Sons, Blackley, Manchester 9, announce further improvements in the properties of their Pulwulol-WNA light-scouring wool oil. The new product now possesses even better light-scouring properties with lower residual oil contents after scouring in even milder almost neutral liquors, still better compatability with wool grease and ease of removal, improved colour and stability on storage and almost complete freedom from smell.

Strict laboratory control in manufacture and stringent performance tests before despatch ensure absolute regularity. Price is unchanged.

Kenilworth Price Cuts

Price cuts ranging from 10 to 20% are announced by the Kenilworth Manufacturing Co. Ltd., West Drayton, Middx. They have been made possible by a recent fall in resin prices, and by increased sales which have, in turn, lowered production costs. The reductions apply to the Hermetal double bond range of epoxy formulations used as structural adhesives and to the D.B. Toolform range of tooling compounds. A number of compounds have also been re-formulated to give improved performance and application properties, and new compositions have been introduced to meet specific needs.

Robinson Bros. Catalogue

Robinson Brothers Ltd., Ryders Green, West Bromwich, have published a new catalogue entitled 'Chemicals for Industry'. The chemicals available in commercial quantities are divided into sections under the headings dithiocarbamates, thiuram sulphides, amines, thioacids and derivatives and miscellaneous chemicals. There are also sections on chemicals available in pilot plant quantities and in evaluation quantities. Information on synonyms, formulae, chemical and physical characteristics, flashpoint, storage stability and uses is given for each chemical.

available now!

SODIUM CHLORITE

From Britain's only manufacturer **LAPORTE** *of course!*

. . . another link in the expanding chain of Laporte products

LAPORTE CHEMICALS LTD., LUTON. *Telephone:* LUTON 4390

L I L
A MEMBER OF THE LAPORTE GROUP OF COMPANIES

NEW PATENTS

By permission of the Controller, H.M. Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On Sale 8 March

High molecular polyethylenes. Ziegler, K. 799 392

ACCEPTANCES

Open to public inspection 8 March

Polymers. Diamond Alkali Co. 862 520

Urea and thiourea derivatives, processes for their production, and compositions containing them. Monsanto Canada Ltd. 862 251

Polyurethane foams. Midland Silicones Ltd. 862 361

Process for the production of brightened articles made from polyacrylonitrile. Farbenfabriken Bayer AG. 862 286

Open to public inspection 15 March

Polyester resins. Albright & Wilson (Mfg.) Ltd. 862 539

Bituminous sealing compositions. B.B. Chemical Co. Ltd., Cooper, I. R., Neal, F. M., and Woods, A. D. 862 544

Preparation of 3-pyridinols. Sadolin & Holmblad A.S. [Addition to 798 320.] 862 581

Ion-exchange in polyphase solvent media. Armour & Co. 863 064

Manufacture of graft copolymers. B.X. Plastics Ltd. 862 610

Cyanine and merocyanine dyes. Ilford Ltd. 862 825

Process for the manufacture of azo-dyestuff solutions. Ciba Ltd. 862 565

Curing compounds for epoxy resins. Minnesota Mining & Manufacturing Co. 862 974

Processes for removing material from metals by chemical attack. Noel, L. 863 065

Production of vinyl chloride-vinyl-ester-vinyl-alcohol copolymers. Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. 862 978

Polyesters of bibenzoic acid. American Viscose Corporation. 862 652

Depolymerisation of cyclic polymers of ε-caprolactam. Imperial Chemical Industries Ltd. 862 567

Fire retardant compositions. Albi Chemical Corporation. 862 569

Manufacture of alkyd resins. Lewis Berger & Sons Ltd. 862 583

Process for reducing the tendency of fibre-forming linear polymers to acquire an electrostatic charge during the processing thereof to form threads or fibres. Vereinigte Glanzstoff-Fabriken AG. 862 963

Apparatus for the catalytic pressure-refining of crude benzene in the presence of hydrogen. Koppers GmbH, H. 862 747

Making uniformly oriented polymer film. Dow Chemical Co. 862 966

Production of coumarone-indene resins. Bergbau-Aktiengesellschaft Neue Hoffnung. 862 547

Azodyestuffs containing a triazide nucleus, their application and process for their manufacture. Ciba Ltd. 863 155

Hydrazine compounds and process for preparing same. Lakeside Laboratories Inc. 863 158

Vulcanizable mixtures. Minnesota Mining & Manufacturing Co. 863 159

Diglycidyl terephthalate. Canadian Industries Ltd. 862 588

Fluorescent triazolyl stilbene compounds and their use. Geigy, AG, J. R. 863 164

Manufacture of polyetherpolyurethane foam material. Hudson Foam Plastics Corporation. 862 549

Production of conjugated diolefines. British Hydrocarbon Chemicals Ltd. 863 136

Sedimentation processes. Badische Anilin- & Soda-Fabrik AG. 862 589

Catalyst olefin polymerisation. Phillips Petroleum Co. 862 985

Process for the manufacture of aromatic hydrocarbons. Farbwerke Hoechst AG. 862 709

Process for the manufacture of nitrogeneous condensation products containing quaternary groups. Farbwerke Hoechst AG. 862 710

Process for the manufacture of water-dispersable, pulverulent pesticidal preparations containing copper. Farbwerke Hoechst AG. 862 842

Process for preparing fibrous and water-insoluble alkali metal titanates and new fibrous crystalline alkali metal tetratitanates. Du Pont de Nemours & Co., E. I. 862 593

Carbamate of a tetracyclic alcohol. Boehme, W. R., and Nichols, J. 862 843

Treatment of aqueous liquid solutions of chelate-forming metal ions with chelate exchange resins. Dow Chemical Co. 862 636

Production of conjugated diolefins. British Hydrocarbon Chemicals Ltd. 863 138

Amidoxime derivatives. Ciba Ltd. 862 859

Curing butyl rubber with polymethylol meta-substituted phenols. Esso Research & Engineering Co. 862 672

Process for curing organopolysiloxanes. Midland Silicones Ltd. 862 844

Vitamin preparations. Mee, A. J., and Smith, T. A. 863 040

Resin solutions comprising resins dissolved in solvent compositions. American-Marietta Co. 862 845

Liquid-coating compositions. Du Pont De Nemours & Co., E. I. 862 675

Process for the flameless combustion of organic substances. Helberger, J. H. 862 771

Production of amorphous aluminas. Peter Spence & Sons Ltd. 862 846

Herbicidal compositions. Imperial Chemical Industries Ltd. 862 847

Production of amido peptides. Uclaf. [Addition to 791 319 and 820 789.] 863 170

Regeneration of cuprous chloride catalysts. Monsanto Chemical Co. 862 848

Process for removing material from metals by chemical attack. Noel, L. [Divided out of 863 065.] 863 066

Production of conjugated diolefins. British Hydrocarbon Chemicals Ltd. 863 139

4:5-Benzotryptamine. Laboratoires Francais De Chimiotherapie. 862 611

Cooling system utilising liquid nitrogen as the coolant. British Oxygen Co. Ltd. 863 076

Process for separating ions by ion exchange. Krumholz, P. 862 688

Vaporisation of liquefied gases. British Oxygen Co. Ltd. 862 758

Cross-linked polyoxymethylenes and process for their preparation. Du Pont de Nemours & Co., E. I. 863 176

Method of producing N-chlorinated isocyanuric acids. American Cyanamid Co. 862 618

Process for the production of pyrophosphoryl chloride. Deutsche Akademie Der Weisen-Schaften Zu Berlin. 862 620

Polymeric materials. Imperial Chemical Industries Ltd. 862 862

Corrosion inhibitors. Monsanto Chemicals Ltd. 862 695

Halogention of rubbery copolymers. Esso Research & Engineering Co. 862 696

Suspension polymerisation and apparatus therefor. Union Carbide Corp. 863 055

Nitrohalo polymers. Purdue Research Foundation. 863 186

Composition comprising vinyl fluoride polymers. Du Pont De Nemours & Co., E. I. 862 572

Alkylation of benzene. British Petroleum Co. Ltd., Yeo, A. A., and Wenham, A. J. M. 863 148

Coated polyolefin. Dow Chemical Co. 862 865

Preparation of trifluoroacetyl fluoride and its derivatives. Du Pont De Nemours & Co., E. I. 862 575

Siloxanes. Midland Silicones Ltd. 862 576

Process for the stability of polyamide structures to light. Vereinighte Glanzstoff-Fabriken AG. 862 577

Rodenticidal compositions. Farbenfabriken Bayer AG. 862 866

Catalytic phosphosulphurisation of hydrocarbons. Esso Research & Engineering Co. 862 578

Plant growth stimulating aerosol compositions. Merck & Son Inc. 862 849

Process for preparing increased molecular weight carboxylic acids and salts thereof from salts of carboxylic acids. Universal Oil Products Co. 862 850

Vanadium catalysts. Stümm GmbH, Geb. 862 691

Bis-triazinylaminostilbene disulphonic acid derivatives. Soc. De Produits Chimiques Et De Synthese. 862 851

Dialkylaminoethyl derivatives of salicylamides. Miles Laboratories Inc. 862 721

Preparation of pyrrolidylmethyl alcohols. Mead Johnson & Co. 862 868

Heat resistant copolymers. Esso Research & Engineering Co. 862 698

Herbicides and algaecides. United States Rubber Co. 862 857

Organopolysiloxanes compositions suitable for use as protective varnishes. Rhone-Poulenc. 862 602

Method of curing butyl rubber in the presence of an oily liquid. Goodyear Tire & Rubber Co. 862 700

Method of producing organic cyclic perfluoroethers having 5- or 6-membered rings. Saline Ludwigshalle AG. 862 538

Preparation of cyano compounds. Shell Research Ltd. 862 937

Process for the preparation of 9 α-hydroxy steroids. Searle & Co., G. D. 862 701

Olefin polymerisation and catalyst for use therein. Shell Internationale Research Maatschappij NV. 862 604

Production of carbazole. Badische Anilin- & Soda-Fabrik AG. 862 606

Polymerisation catalysts. Shell Internationale Research Maatschappij NV. 862 608

Crosslinking of polymers. Badische Anilin- & Soda-Fabrik AG. 862 869

Lubricating oil compositions. Shell Internationale Research Maatschappij NV. 862 827

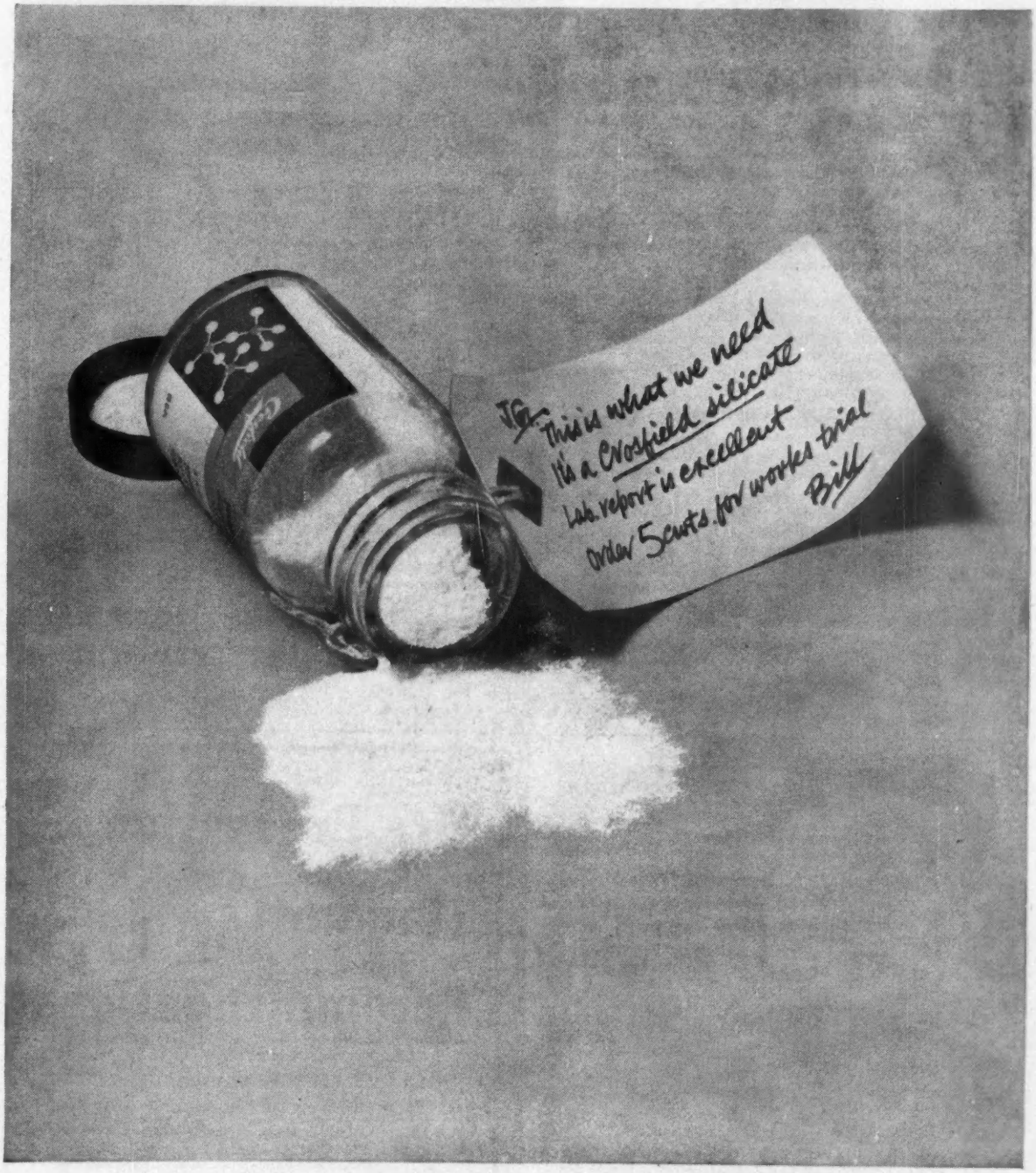
Modification of condensation polymers. Du Pont De Nemours & Co., E. I. 862 768

Sulphanilamido-pyrazoles. Boehringer & Soehne GmbH, C. F. 863 060

Amino acid derivatives. Uclaf. [Divided out of 863 170.] 863 171

Proceedings of the Second Packaging Conference Available

The Proceedings of the Second Association of British Chemical Manufacturers' Association Packaging Conference held at Harrogate from 1 to 3 November 1960, are available. (See CHEMICAL AGE, 12 November 1960, p. 817). Copies are available to non-members of the Association, price £1 1s, cash with order.



Have you considered using a silicate from the extensive Crosfield range? Whether you want to improve an existing product, develop a new one, save on material costs or simply solve a production problem, we may be able to help.

Crosfield silicates are already being widely used as extenders, reinforcing fillers, binding agents, deflocculators, suspending agents, adhesives and as desiccants in packaging.

Tell us YOUR *requirements and we'll send you a sample of the Crosfield silicate most suited to your specific job.*

CROSFIELD MANUFACTURE SILICATES FOR INDUSTRIAL USES

Crosfield CHEMICALS

CSP 47-9056-65

JOSEPH CROSFIELD & SONS LTD · WARRINGTON · LANCASHIRE

Market Reports

INTEREST IN FERTILISERS MORE ACTIVE

LONDON Fair conditions have been reported in most sections of the industrial chemicals market, although the volume of new business remains moderate. However, the movement into consumption against existing commitments is keeping well up to schedule, and there has been a good flow of export enquiry for a wide range of chemicals and allied materials.

Interest in fertilisers is becoming more active and a steady expansion in the market can be expected. The overall position of coal tar products is again little changed, with spot supplies of a number of items difficult to arrange. There has been a moderate enquiry for pitch on home and export account.

MANCHESTER Trading conditions have been reasonably satisfactory. A fair number of additional orders have been reported, many of them relating to spot lots, and the textile and allied trades and most other industrial outlets are specifying for steady deliveries against contracts. The shipping movement is reported to be on a fair scale. There has been little change of any consequence in the general price position. The tar products are mostly finding a ready outlet, and a continued slight improvement in the demand for fertilisers has been reported.

SCOTLAND Once again a good level of trading has been maintained during the past week in the Scottish heavy chemical market. Home demands have been brisk and the general range of basic chemicals have been well demanded, and again those pertaining to the textile and allied industries. Deliveries against contracts have also featured well. Prices have been fairly steady with little variation taking place. The overseas market has again shown considerable interest with enquiries still numerous.

New Associate Members for Laboratory Ware Association

The following manufacturers of laboratory apparatus have recently been elected associate members of the British Laboratory Ware Association Ltd.: Beatson, Clark and Co. Ltd., Rotherham; Davey and Moore Ltd., Bromsdown, Middlesex; Electro-Thermal Engineering Ltd., London E.7; Helix Universal Ltd., Lye, Stourbridge; T. and W. Ide Ltd., Glass House Fields, London E.1; Isopad Ltd., Boreham Wood, Herts; Nickel-Electro Ltd., Smethwick; John Poulten Ltd., Barking, Essex; R. and L. Enterprises Ltd., Stanniggley, Pudsey.

DIARY DATES

MONDAY 6 FEBRUARY

C.S.—Leicester: University, Chem. Dept., 4.30 p.m. 'Mechanism of some organometal substitutions', by Sir Christopher Ingold.

S.C.I. & R.I.C.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Fuel cells', by Dr. H. H. Chambers.

S.C.I. & R.S.A.—London: R.S.A. John Adam St., W.C.2, 6 p.m. Third Cantor Lecture on 'Modern chemical industry in Gt. Britain', by Dr. J. Taylor.

TUESDAY 7 FEBRUARY

Plastics Inst.—London: Wellcome Bldgs, Euston Rd., N.W.1, 6.30 p.m. 'Situation & trends in the French plastics industry', by M. Léon Jacqué.

R.I.C.—London: Sir John Cass Coll, Jewry St., E.C.3, 6 p.m. 'Organic reactions in strong alkalis', by Prof. B. C. L. Weedon.

S.C.I.—Birmingham: Engineering Centre, Stephenson Pl., 7 p.m. Reading of original papers.

S.C.I.—London: 14 Belgrave Sq., S.W.1, 10.30 a.m. Meeting on fertilisers.

WEDNESDAY 8 FEBRUARY

C.S.—Portsmouth: Coll. of Tech., 7 p.m. 'Silicones, their properties & industrial applications', by A. N. Tizard.

S.C.I.—Newcastle: Chem. Dept., King's Coll., 6.30 p.m. 'Coal & its products in the North-East'.

THURSDAY 9 FEBRUARY

C.S.—Aberystwyth: Univ., Edward Davies Chem. Labs. 'Biosynthesis of terpenoids with special reference to carotenoids', by Prof. T. W. Goodwin.

C.S.—Bristol: Univ. Chem. Dept., 5.15 p.m. 'Infra-red spectra of some inorganic complexes', by Dr. D. W. A. Sharp.

C.S.—London: Burlington Hse., Piccadilly, W.1, 7.30 p.m. Meeting for reading of original papers.

FRIDAY 10 FEBRUARY

C.S.—Cambridge: Univ. Chem. Lab., Lensfield Rd., 8.30 p.m. 'Mobile stereochemistry of nitrogen', by Dr. K. Schofield.

C.S.—Exeter: Washington Singer Labs., Univ., 5 p.m. 'Aspects of phenol biogenesis', by Prof. C. H. Hassall.

C.S.—St. Andrews: Chem. Dept., St. Salvators Coll., 5.15 p.m. 'Hydrogen bonding & some crystal structures', by Dr. J. C. Speakman.

C.S.—Southampton: Univ. Chem. Dept., 5 p.m. 'Porphyrin group of natural pigments', by Prof. A. W. Johnson.

CLASSIFIED ADVERTISEMENTS

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra.
SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.

EDUCATIONAL

A.M.I.CHEM.E.—More than one-third of the successful candidates since 1944 have been trained by T.I.G.B. All seeking quick promotion in the Chemical and Allied Industries should send for the T.I.G.B. Prospectus. 100 pages of expert advice, details of Guaranteed Home Study Courses for A.M.I.Chem.E., B.Sc.Eng., A.M.I.Mech.E., A.M.I.Prod.E., C. & G., etc., and a wide range of Diploma Courses in most branches of Engineering. Send for your copy today—**FREE**. T.I.G.B. (Dept. 84), 29 Wright's Lane, London, W.8.

FOR SALE

FOR SALE in large or small lots. Quantity of 11 gall. stainless steel (FDP) drums with galvanised iron protecting rims. Two inlets for screw bushes and valves. Pressure tested at manufacture to 80 lb. Originally used for draught beer. For details Apply: **Box Number 3739, Chemical Age.**

CHARCOAL, ANIMAL AND VEGETABLE, Horticultural burning, filtering, disinfecting, medicinal. Also lumps, ground and granulated. **THOMAS HILL-JONES, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3 (TELEPHONE: EAST 3285).**

MATERIALS WANTED

WANTED

Scrap Electrode Carbons, Graphite Offcuts, etc.

send samples and details of tonnage available to

FINE GRINDING LTD.,
Blackhole Mine, Eyam, Derbys
'phone Eyam 227

MISCELLANEOUS

Required by Advertiser, one copy of the following publication: "Uses and Applications of Chemical and Related Materials", compiled and edited by T. C. Gregory and published by the Reinhold Publishing Corporation. **Box No. 3736, Chemical Age.**

OVERSEAS OPPOINTMENTS

AGRICULTURAL CHEMIST, KENYA

To take charge of research projects into soil and plant nutrition problems of coffee.

Candidates must have a good Honours degree in Agricultural Chemistry or Chemistry with at least two years post-graduate research experience in agricultural chemistry.

Appointment on probation for permanent establishment with pensionable emoluments in scale £981-£1,863 per annum. Free passages on appointment and leave for officer, wife and children up to equivalent of three adult passages in all. Furnished quarters, usually available, at moderate rental.

Apply, stating full name and giving brief particulars of qualifications and experience, to Director of Recruitment, Colonial Office, London, S.W.1. Quoting BCD 63/7/050/F1.

BOX NUMBERS: *Reply c/o "Chemical Age" · Bouverie House · Fleet Street EC4.*

PATENTS & TRADE MARKS

KINGS PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a Queen Victoria Street, London, E.C.4. City 6161. Booklet on request.

PLANT AND MACHINERY FOR SALE

Baker-Perkins Class BB "Double Naben" Bladed Steam Jacketed Mixers. Four—size 12 and Three—size 11, of 20 and 8 gallons respectively.

Oil Jacketed Double Trough Mixer 48 in. by 36 in. by 29 in. deep. Paddle Blades. Bottom Outlets.

Barron 'U' Sifter Mixer 96 in. by 33 in. by 33 in. with 10 H.P. A.C. Motor.

Gardner 'U' Sifter-Mixers 66 in. by 24 in. by 24 in. with 5 H.P A.C. Motors. Four available, of modern streamlined design.

Horizontal 'U' Trough Mixers 48 in. by 18 in. by 22 in. Three —Tilting type, Paddle Blades. Glanded.

Over-Arm Twin-Blade, Tilting, 30 gallon Mixers with 3 H.P. Geared Motors. Five available.

Lying at our No. 2 Depot, Willow Tree Works, Swallowfield, Berkshire.

Apply: Winkworth Machinery Limited, 65 High Street, Staines, Middlesex. Telephone 55951.

Phone 55298 Staines

Stainless Steel Jac. Cyl. Mixers 50, 100 & 150 gallons.
Stainless Steel Vac. 'Z' blade Mixer 3 ft. by 3 ft. by 3 ft., 40 h.p. A.C.
"Steelshaw" Porcelain Lined Ball Mills, 4 ft. by 3 ft. & 5 ft. by 4 ft. dia.
Enamel lined Jac. Reactors 2 ft. 6 in. by 3 ft. dia.
(3) 10,000 gall. Welded Steel Cyl. Enc. Tanks.
"Johnson" Jac. Filter Press, 8 plates, 9 frames 25 in. sq.
"Johnson" Lab. Filter Press, 4 plates 5 frames 9 in. sq., with pump.
Steel Cased Fan 18 in. inlet *Water Cooled Bearings*, 12½ h.p. A.C. 24 in. dia. "Flameproof" Axial Flo Fan, 2 h.p. 400/3/50.

Send for Lists

HARRY H. GARDAM & CO. LTD.,
100 CHURCH STREET, STAINES

VACUUM PUMP by Hick, Hargreaves. Single stage, water-cooled, rotary, 28 in. Hg. 1,450 r.p.m., 100 c. ft. per minute. 7 h.p. motor, 400/440/3/50 and starter; direct coupled on combined bedplate. Excellent condition.
Apply: Barber's, 72 Park Road, Hampton Hill, Middx. Phone: Molesey 3196.

OUR NEW VALVE CATALOGUE IS NOW AVAILABLE. NEW AND RECONDITIONED VALVES FOR ALL DUTIES AT MOST ATTRACTIVE PRICES.

G. E. SIMM (MACHINERY) LTD.,
BROOMGROVE ROAD, SHEFFIELD 10

SITUATIONS VACANT

RESEARCH

A COMPETENT, YOUNG CHEMIST (OR CHEMICAL ENGINEER)
is needed to direct the work of the By-Products Group at the National Coal Board's Research Laboratories, near Cheltenham.

Essential qualifications include a background of practical physical chemistry, together with the ability to lead a research team through challenging problems. There are excellent facilities to encourage original work.

Salary up to £2,500.

Applications to—
HEADQUARTERS STAFF MANAGER (X.2048/2E),
NATIONAL COAL BOARD,
HOBART HOUSE,
GROSVENOR PLACE,
LONDON, S.W.1,
before 20th February, 1961.

TECHNICAL INFORMATION OFFICER/LIBRARIAN

The Resin Division of the Coates Group of Companies wishes to appoint a Librarian/Technical Information Officer to take charge of the library of its expanding research laboratories at **St. Mary Cray, Kent.**

The responsibilities of this important position include cataloguing and classifying, reference work, the preparation of literature reviews and patent searching.

Applicants should have a qualification in Chemistry and experience in industrial library work, preferably in the chemical industry.

Generous salary scales and conditions of employment, including superannuation and sickness fund benefits. Please write to the Technical Staff Officer, St. Mary Cray.

EIMCO (GREAT BRITAIN) LIMITED
FILTER DIVISION
(Sedimentation & Filtration Engineering)
have vacancies for

SALES ENGINEERS AND LABORATORY STAFF

for London and Gateshead.

Excellent opportunities exist in this rapidly expanding Division of the Company for **ENGINEERS** (Mechanical, Chemical or Metallurgical) and **CHEMISTS,** for either category. Some experience in Chemical plant design and manufacture, and/or Sales Works, or in plant operation in one of the major process industries, would be an advantage but is not essential. Good personality, adaptability and sound technical background essential. Adequate initial training, non-contributory pension scheme. Company car provided where appropriate.

Applicants, preferably between the age of 25 to 38, should write giving full particulars, and present salary to:

PERSONNEL OFFICER,
EIMCO (GREAT BRITAIN) LIMITED,
EARLSWAY, TEAM VALLEY, GATESHEAD 11.

RESEARCH CHEMISTS
Sondes Place Research Institute,
DORKING, SURREY,
has vacancies for
PHYSICAL and INORGANIC CHEMISTS
for research on fuel cells and other projects. Salaries according to age and experience. Permanent positions; five-day week; pension scheme.
Write for application form.

WORK WANTED & OFFERED

CRUSHING, GRINDING, MIXING and DRYING for the trade
THE CRACK PULVERISING MILLS LTD.
Plantation House,
Mincing Lane,
London, E.C.2

Chemical Age Enquiry Service

For fuller details of equipment, apparatus, chemicals etc., in the advertisement or editorial page of Chemical Age, fill in the coupons below, ONE PER ENQUIRY, and return to us.

Please send further details about .....
.....
.....
mentioned on page .....*of this issue.*
Name ..... *Position* .....
Firm .....
Address .....
.....
Chemical Age Enquiry Service.

Please send further details about .....
.....
.....
mentioned on page .....*of this issue.*
Name ..... *Position* .....
Firm .....
Address .....
.....
Chemical Age Enquiry Service.

Please send further details about .....
.....
.....
mentioned on page .....*of this issue.*
Name ..... *Position* .....
Firm .....
Address .....
.....
Chemical Age Enquiry Service.

★ *Detach this page complete then fold as marked overleaf to use the post-paid reply folder*

2nd FOLD

Postage will be paid by the Licensee

No Postage Stamp necessary if posted in Great Britain or Northern Ireland

BUSINESS REPLY FOLDER
Licence No. 2501

CHEMICAL AGE
154-160 FLEET STREET
LONDON, E.C.4

1st FOLD

3rd FOLD

Chemical Age

ENQUIRY SERVICE

★

- *This is a special service for readers of*
  CHEMICAL AGE
- *It is designed to give fuller information on equipment, apparatus, chemicals etc., mentioned in this issue—whether in the editorial text or in an advertisement*
- *Cut out the whole of this page, fold as instructed with post-paid address on the outside*

★

Chemical Age
154 Fleet Street, London, E.C.4
Tel.: Fleet Street 3212

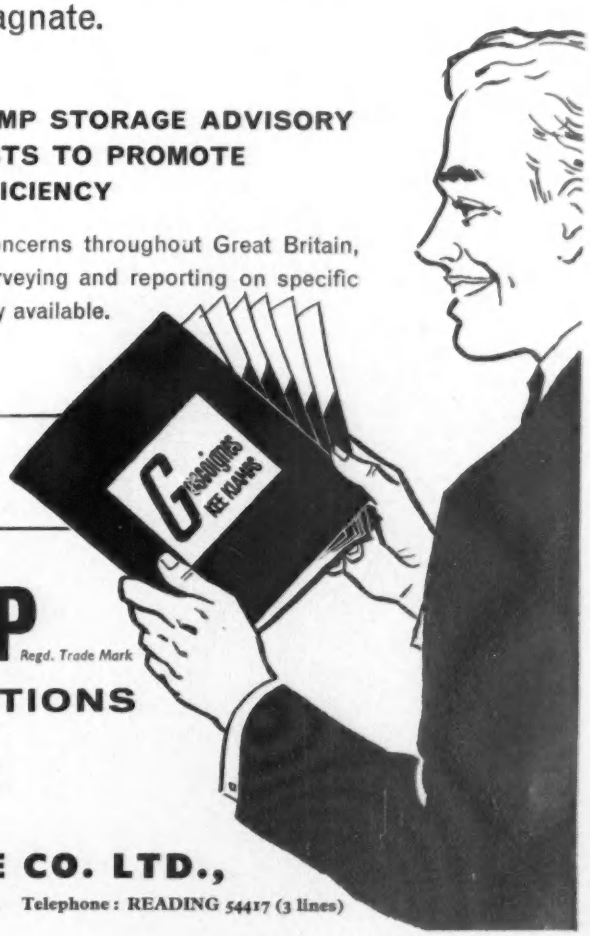
CUT ALONG THIS DOTTED LINE

Are storage problems turning your production efficiency UPSIDE DOWN?

An efficient stores department, like a sound heart, does its work unnoticed, but one that falters can cause the whole system to stagnate.

THE KEE KLAMP STORAGE ADVISORY SERVICE EXISTS TO PROMOTE STORAGE EFFICIENCY

Used by major concerns throughout Great Britain, its services in surveying and reporting on specific problems are freely available.



THIS BROCHURE WILL TELL YOU MORE

KEE KLAMP Regd. Trade Mark

STORAGE INSTALLATIONS

Save space, manpower . . . and streamline the whole process of materials handling and storage.

GEO. H. GASCOIGNE CO. LTD.,

599 GASCOIGNE HOUSE, READING, BERKS. Telephone: READING 54417 (3 lines)

Printed in Great Britain by THE PRESS AT COOMBELANDS LTD., Addlestone, Surrey, and published by BENN BROTHERS LTD., at Bouverie House, 154 Fleet Street, E.C.4. Registered at the General Post Office. Entered as Second Class Matter at the New York U.S.A., Post Office.